5

Troubleshooting

This chapter provides descriptions of the drive faults, alarms, errors, related displays, and possible solutions. This chapter can also serve as a reference guide for tuning the drive during a trial run.

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5.1 Section Safety

⚠ DANGER

Electrical Shock Hazard

Do not connect or disconnect wiring while the power is on.

Failure to comply will result in death or serious injury.

⚠ WARNING

Electrical Shock Hazard

Do not operate equipment with covers removed.

Failure to comply could result in death or serious injury.

The diagrams in this section may illustrate drives without covers or safety shields to display details. Be sure to reinstall covers or shields before operating the drives and run the drives according to the instructions described in this manual.

Always ground the motor-side grounding terminal.

Improper equipment grounding could result in death or serious injury by contacting the motor case.

Do not touch terminals before the capacitors have fully discharged.

Failure to comply could result in death or serious injury.

Before wiring terminals, disconnect all power to the equipment. The internal capacitor remains charged even after the drive input power is turned off. The charge indicator LED will extinguish when the DC bus voltage is below 50 Vdc. To prevent electric shock, wait at least five minutes after all indicators are off and measure the DC bus voltage level to confirm safe level.

⚠ WARNING

Do not allow unqualified personnel to perform work on the drive.

Failure to comply could result in death or serious injury.

Installation, maintenance, inspection and servicing must be performed only by authorized personnel familiar with installation, adjustment and maintenance of AC drives.

Do not perform work on the drive while wearing loose clothing, jewelry, or without eye protection.

Failure to comply could result in death or serious injury.

Remove all metal objects such as watches and rings, secure loose clothing and wear eye protection before beginning work on the drive.

Do not remove covers or touch circuit boards while the power is on.

Failure to comply could result in death or serious injury.

⚠ WARNING

Fire Hazard

Tighten all terminal screws to the specified tightening torque.

Loose electrical connections could result in death or serious injury by fire due to overheating of electrical connections.

Do not use an improper voltage source.

Failure to comply could result in death or serious injury by fire.

Verify that the rated voltage of the drive matches the voltage of the incoming drive input power before applying power.

Do not use improper combustible materials.

Failure to comply could result in death or serious injury by fire.

Attach the drive to metal or other noncombustible material.

NOTICE

Observe proper electrostatic discharge procedures (ESD) when handling the drive and circuit boards.

Failure to comply may result in ESD damage to the drive circuitry.

Never connect or disconnect the motor from the drive while the drive is outputting voltage.

Improper equipment sequencing could result in damage to the drive.

Do not use unshielded cable for control wiring.

Failure to comply may cause electrical interference resulting in poor system performance. Use shielded twisted-pair wires and ground the shield to the ground terminal of the drive.

Do not allow unqualified personnel to use the product.

Failure to comply could result in damage to the drive or braking circuit.

Carefully review instruction manual TOBPC72060000 when connecting a braking option to the drive.

Do not modify the drive circuitry.

Failure to comply could result in damage to the drive and will void warranty.

OYMC is not responsible for modification of the product made by the user.

Check all the wiring after installing the drive and connecting other devices to ensure that all connections are correct.

Failure to comply could result in damage to the drive.

5.2 Motor Performance Fine Tuning

This section offers helpful information for counteracting oscillation, hunting, or other faults that occur while performing a trial run. Refer to the section below that corresponds to the motor control method used.

Note: This section describes parameters that are commonly edited. Consult OYMC or an OYMC sales representative for more information on detailed settings and fine-tuning the drive.

◆ V/f Motor Control Method Tuning

Table 5.1 Parameters for Tuning the Drive in V/f Motor Control Method

Problem	Parameter No.	Countermeasure	Default Value	Suggested Setting
• Motor hunting and oscillation at speeds between 10 and 40 Hz	Hunting Prevention Gain (n1-02)	• If insufficient motor torque relative to the size of the load causes hunting, reduce the setting. • When motor hunting and oscillation occur with a light load, increase the setting.	1.00	0.50 to 2.00
• Motor noise • Motor hunting and oscillation at speeds up to 40 Hz	Carrier Frequency Selection (C6-02)	• If the motor noise is too loud, increase the carrier frequency. • When motor hunting and oscillation occur at speeds up to 40 Hz, lower the carrier frequency. • The default setting for the carrier frequency depends on the drive capacity (o2-04) and the Drive Duty Selection (C6-01).	dep. on drive capacity	1 to A
• Poor torque or speed response • Motor hunting and oscillation	Torque Compensation Primary Delay Time (C4-02)	• If motor torque and speed response are too slow, decrease the setting. • If motor hunting and oscillation occur, increase the setting.	200 ms <I>	100 to 1000 ms
• Poor motor torque at speeds below 10 Hz • Motor hunting and oscillation	Torque Compensation Gain (C4-01)	• If motor torque is insufficient at speeds below 10 Hz, increase the setting. • If motor hunting and oscillation with a relatively light load, decrease the setting.	1.00	0.50 to 1.50
• Poor motor torque at low speeds • Motor instability at motor start	Mid Output Voltage A (E1-08) Minimum Output Voltage (E1-10)	• If torque is insufficient at speeds below 10 Hz, increase the setting. • If motor instability occurs at motor start, decrease the setting. **Note:** The recommended setting value is for 200 V class drives. Double this value when using a 400 V class drive.	E1-08: 16.0 V E1-10: 12.0 V <I>	Initial value ±5 V
• Poor speed precision	Slip Compensation Gain (C3-01)	• After setting the motor-rated current (E2-01), motor-rated slip (E2-02) and motor no-load current (E2-03), adjust the slip compensation gain (C3-01).	-	0.5 to 1.5

<1> Default settings change when the Control Method is changed (A1-02) or a different V/f pattern is selected using parameter E1-03. The default setting shown is for V/f Control.

Note: Use slip compensation to improve speed precision in V/f Control. First make sure that the proper values have been set for the motor rated current to E2-01, motor rated slip (E2-02), and motor no-load current (E2-03). Next, adjust the slip compensation gain set to C3-01 so that it is between 0.5 to 1.5.

◆ Open Loop Vector (OLV) Motor Control Method Tuning

Table 5.2 Parameters for Tuning the Drive in OLV Motor Control Method

Problem	Parameter No.	Countermeasure	Default Value	Suggested Setting
• Poor motor torque and speed response • Control motor hunting and oscillation at speeds between 10 and 40 Hz.	AFR Gain (n2-01)	• If motor torque and speed response are too slow, gradually decrease the setting by 0.05. • If motor hunting and oscillation occur, gradually increase the setting by 0.05.	1.00	0.50 to 2.00
• Poor motor torque and speed response • Control motor hunting and oscillation at speeds between 10 and 40 Hz.	AFR Time Constant 1 (n2-02)	• To improve motor torque speed response, gradually reduce this setting by 10 ms and check the performance. • If motor hunting and oscillation occur as a result of load inertia, gradually increase the setting by 50 ms and check the performance. **Note:** Ensure that n2-02 ≤ n2-03. When making adjustments to n2-02, set C4-02 (Torque Compensation Primary Delay Time Constant 1) accordingly.	50 ms	50 to 2000 ms
• Overvoltage trips when accelerating, decelerating, or during sudden speed or load changes.	AFR Time Constant 2 (n2-03)	• If overvoltage trips occur, gradually increase this setting by 50 ms. • If response is slow, gradually reduce this setting by 10 ms. **Note:** Ensure that n2-02 ≤ n2-03. When making adjustments to n2-03, increase the value of C4-06 (Torque Compensation Primary Delay Time 2) proportionally.	750 ms	750 to 2000 ms
	Torque Compensation Primary Delay Time Constant 2 (C4-06)	• If overvoltage trips occur, gradually increase this setting by 10 ms and check the performance. • If response is slow, gradually reduce this setting by 2 ms and check the performance. **Note:** Ensure that C4-02 ≤ C4-06. When changing C4-06 (Torque Compensation Primary Delay Time Constant 2), increase the value of n2-03 proportionally.	150 ms	150 to 750 ms

Problem	Parameter No.	Countermeasure	Default Value	Suggested Setting
• Poor motor torque and speed response • Motor hunting and oscillation.	Torque Compensation Primary Delay Time Constant 1 (C4-02)	• To improve motor torque speed response, gradually reduce this setting by 2 ms and check the performance. • If motor hunting and oscillation occur, gradually increase this setting by 10 ms. **Note:** Ensure that C4-02 ≤ C4-06. When making adjustments to C4-02, increase n2-02 (AFR Time Constant) proportionally.	20 ms <1>	20 to 100 ms
• Poor speed response and stability	Slip Compensation Primary Delay Time Constant (C3-02)	• If response is slow, gradually decrease the setting by 10 ms. • If speed is unstable, gradually increase the setting by 10 ms.	200 ms <1>	100 to 500 ms
• Poor speed precision	Slip Compensation Gain (C3-01)	• If speed is too slow, gradually increase the setting by 0.1 ms. • If speed is too fast, gradually decrease the setting by 0.1 ms.	1.0 <1>	0.5 to 1.5
• Motor noise • Control motor hunting and oscillation occur at speeds below 10 Hz.	Carrier Frequency Selection (C6-02)	• If there is too much motor noise, the carrier frequency is too high. • If motor hunting and oscillation occur at low speeds, reduce the carrier frequency. • The default setting for the carrier frequency depends on the drive capacity (o2-04) and Drive Duty Selection (C6-01).	dep. on drive capacity	0 to the default setting
• Poor motor torque at low speeds • Poor speed response • Motor instability at motor start.	Mid Output Voltage A (E1-08) Minimum Output Voltage (E1-10)	• If motor torque and speed response are too slow, increase the setting. • If the motor exhibits excessive instability at start-up, reduce the setting. **Note:** The default value is for 200 V class units. Double this value when using a 400 V class drive. When working with a relatively light load, increasing this value too much can create an excessively high of a torque reference.	E1-08: 12.0 V <1> E1-10: 2.5 V <1>	Initial ±2 V

<1> Default settings change when the Control Method is changed (A1-02) or a different V/f pattern is selected using parameter E1-03. The default setting shown is for V/f Control.

When using OLV Motor Control, leave the torque compensation gain (C4-01) at its default setting of 1.00. To increase speed precision during regeneration in OLV Motor Control, enable slip compensation during regeneration (C3-04 = "1").

◆ Motor Hunting and Oscillation Control Parameters

In addition to the parameters discussed in *V/f Pattern Selection: E1-03 on page 134*, the following parameters indirectly affect motor hunting and oscillation.

Table 5.3 Parameters that Affect Control Performance in Applications

Name (Parameter No.)	Application
Dwell Function (b6-01 through b6-04)	Prevents motor speed loss by maintaining the output frequency when working with heavy loads or when there is powerful backlash on the machine side.
Accel/Decel Time (C1-01 through C1-11)	Adjusting accel and decel times will affect the torque presented to the motor during acceleration or deceleration.
S-Curve Characteristics (C2-01 through C2-04)	Prevents shock at the beginning and end of acceleration and deceleration.
Jump Frequency (d3-01 through d3-04)	Skips over the resonant frequencies of connected machinery.
Analog Filter Time Constant (H3-13)	Prevents fluctuation in the analog input signal due to noise.
Stall Prevention (L3-01 through L3-06, L3-11)	• Prevents motor speed loss and overvoltage. Used when the load is too heavy and also during sudden acceleration/deceleration. • Adjustment is not normally required because Stall Prevention is enabled as a default. Disable Stall Prevention during deceleration (L3-04 = “0”) when using a braking resistor.
Torque Limits (L7-01 through L7-04, L7-06, L7-07)	• Sets the maximum torque for Open Loop Vector Control. • Ensure that the drive capacity is greater than the motor capacity when increasing this setting. Be careful when reducing this value because motor speed loss may occur with heavy loads.

5.3 Drive Alarms, Faults, and Errors

◆ Types of Alarms, Faults, and Errors

Check the LED operator for information about possible faults if the drive or motor fails to operate. *Refer to Using the Digital LED Operator on page 87*.

If problems occur that are not covered in this manual, contact the nearest OYMC representative with the following information:

- Drive model
- Software version
- Date of purchase
- Description of the problem

Table 5.4 contains descriptions of the various types of alarms, faults, and errors that may occur while operating the drive.

Contact OYMC or an OYMC representative in the event of drive failure.

Table 5.4 Types of Alarms, Faults, and Errors

Type	Drive Responses to Alarms, Faults, and Errors
Faults	• When the drive detects a fault: • The digital operator displays text that indicates the specific fault and the ALM indicator LED remains lit until the fault is reset. • The fault interrupts drive output and the motor coasts to a stop. • Depending on the setting, the drive and motor may stop via different methods than listed. • If a digital output is programmed for fault output (H2-☐☐ = E), it will close if a fault occurs. • When the drive detects a fault, it will remain inoperable until that fault has been reset. *Refer to Fault Reset Methods on page 223*.
Minor Faults and Alarms	• When the drive detects an alarm or a minor fault: • The digital operator displays text that indicates the specific alarm or minor fault and the ALM indicator LED flashes. • The motor does not stop. • One of the multi-function contact outputs closes if set to be tripped by a minor fault (H2-☐☐ = 10), but not by an alarm. • The digital operator displays text indicating a specific alarm and ALM indicator LED flashes. • Remove the cause of an alarm or minor fault to automatically reset.
Operation Errors	• When parameter settings conflict with one another or do not match hardware settings (such as with an option card), it results in an operation error. • When the drive detects an operation error: • The digital operator displays text that indicates the specific error. • Multi-function contact outputs do not operate. • When the drive detects an operation error, it will not operate the motor until the error has been reset. Correct the settings that caused the operation error to reset.

Type	Drive Responses to Alarms, Faults, and Errors
Tuning Errors	• Tuning errors occur while performing Auto-Tuning. • When the drive detects a tuning error: • The digital operator displays text indicating the specific error. • Multi-function contact outputs do not operate. • Motor coasts to stop. • Remove the cause of the error and repeat the Auto-Tuning process.

◆ Alarm and Error Displays

■ Faults

When the drive detects a fault, the ALM indicator LEDs remain lit without flashing. If the LEDs flash, the drive has detected a minor fault or alarm. *Refer to Minor Faults and Alarms on page 180* for more information. An overvoltage situation trips both faults and minor faults, therefore it is important to note whether the LEDs remain lit or if the LEDs flash.

LED Operator Display		Name	Page
bUS	bUS	Option Communication Error	183
CE	CE	MEMOBUS/Modbus Communication Error	183
CF	CF	Control Fault	184
CoF	CoF	Current Offset Fault	184
CPF02	CPF02	A/D Conversion Error	184
CPF03	CPF03	PWM Data Fault	184
CPF06	CPF06	Drive specification mismatch during Terminal Board or Control Board replacement	184
CPF07	CPF07	Terminal Board Communication Fault	185
CPF08	CPF08	EEPROM Serial Communications Fault	185
CPF11	CPF11	RAM Fault	185

LED Operator Display		Name	Page
CPF22	CPF22	A/D Conversion Error	186
CPF23	CPF23	PWM Feedback Data Fault	187
CPF24	CPF24	Drive Capacity Signal Fault	187
dEv	dEv	Excessive Speed Deviation (for Simple V/f with PG)	187
EF0	EF0	Option Card External Fault	187
EF1 to EF6	EF1 to EF6	External Fault (input terminal S1 to S6)	188
FbH	FbH	Excessive PID Feedback	188
FbL	FbL	PID Feedback Loss	189
GF	GF	Ground Fault	189
LF	LF	Output Phase Loss	189

LED Operator Display		Name	Page
CPF 12	CPF12	FLASH Memory Fault	185
CPF 13	CPF13	Watchdog Circuit Exception	185
CPF 14	CPF14	Control Circuit Fault	186
CPF 16	CPF16	Clock Fault	186
CPF 17	CPF17	Timing Fault	186
CPF 18	CPF18	Control Circuit Fault	186
CPF 19	CPF19	Control Circuit Fault	186
CPF20 or CPF21	CPF20 or CPF21	RAM Fault	186
		FLASH Memory Fault	186
		Watchdog Circuit Exception	186
		Clock Fault	186
oH3	oH3	Motor Overheat 1 (PTC input)	193
oH4	oH4	Motor Overheat 2 (PTC input)	193
oL1	oL1	Motor Overload	193
oL2	oL2	Drive Overload	194
oL3	oL3	Overtorque Detection 1	195
oL4	oL4	Overtorque Detection 2	195
oL5	oL5	Mechanical Weakening Detection 1	195
oL7	oL7	High Slip Braking OL	195
oPr	oPr	Operator Connection Fault	196

LED Operator Display		Name	Page
LF2	LF2	Output Open Phase	190
oC	oC	Overcurrent	190
oFA00	oFA00	Option Card Fault (port A)	191
oH	oH	Heatsink Overheat	192
oH1	oH1	Heatsink Overheat	192
PGo	PGo	PG Disconnect (for Simple V/f with PG)	198
rH	rH	Dynamic Braking Resistor	198
rr	rr	Dynamic Braking Transistor	199
SEr	SEr	Too Many Speed Search Restarts	199
STO	STO	Pull-Out Detection	199
UL3	UL3	Undertorque Detection 1	199
UL4	UL4	Undertorque Detection 2	200
UL5	UL5	Mechanical Weakening Detection 2	200
Uv1	Uv1	Undervoltage	200
Uv2	Uv2	Control Power Supply Undervoltage	201
Uv3	Uv3	Soft Charge Circuit Fault	201
oS	oS	Overspeed (for Simple V/f with PG)	196
ov	ov	Overvoltage	196
PF	PF	Input Phase Loss	197

Note: If faults CPF11 through CPF19 occur, the LED operator will display CPF00 or CPF 11.

■ Minor Faults and Alarms

When a minor fault or alarm occurs, the ALM LED flashes and the text display shows an alarm code. A fault has occurred if the text remains lit and does not flash. *Refer to Alarm Detection on page 202*. An overvoltage situation, for example, can trigger both faults and minor faults. It is therefore important to note whether the LEDs remain lit or if the LEDs flash.

Table 5.5 Minor Fault and Alarm Displays

LED Operator Display		Name	Minor Fault Output (H2-☐☐ = 10)	Page
bb	bb	Drive Baseblock	No output	*202*
bUS	bUS	Option Card Communications Error	YES	*202*
CALL	CALL	Serial Communication Transmission Error	YES	*203*
CE	CE	MEMOBUS/Modbus Communication Error	YES	*203*
CrST	CrST	Can not Reset	YES	*204*
dEv	dEv	Excessive Speed Deviation (for Simple V/f with PG)	YES	*204*
dnE	dnE	Drive Disabled	YES	*205*
EF	EF	Run Command Input Error	YES	*205*
EF0	EF0	Option Card External Fault	YES	*205*
EF1 to EF6	EF1 to EF6	External Fault (input terminal S1 to S6)	YES	*206*
FbH	FbH	Excessive PID Feedback	YES	*206*
FbL	FbL	PID Feedback Loss	YES	*206*
Hbb	Hbb	Safe Disable Signal Input	YES	*207*
HbbF	HbbF	Safe Disable Signal Input	YES	*207*
SE	SE	MEMOBUS/Modbus Test Mode Fault	YES	
oL5	oL5	Mechanical Weakening Detection 1	YES	*195*
UL5	UL5	Mechanical Weakening Detection 2	YES	*200*

LED Operator Display		Name	Minor Fault Output (H2-□□ = 10)	Page
dWAL	dWAL	FBD's Alarm	YES	187
HCA	HCA	Current Alarm	YES	207
oH	oH	Heatsink Overheat	YES	208
oH2	oH2	Drive Overheat	YES	208
oH3	oH3	Motor Overheat	YES	208
oL3	oL3	Overtorque 1	YES	209
oL4	oL4	Overtorque 2	YES	209
oS	oS	Overspeed (for Simple V/f with PG)	YES	209
ov	ov	Overvoltage	YES	210
PASS	PASS	MEMOBUS/Modbus Test Mode Complete	No output	210
PGo	PGo	PG Disconnect (for Simple V/f with PG)	YES	211
rUn	rUn	During Run 2, Motor Switch Command Input	YES	211
UL3	UL3	Undertorque 1	YES	211
UL4	UL4	Undertorque 2	YES	211
Uv	Uv	Undervoltage	YES	212

■ Operation Errors

Table 5.6 Operation Error Displays

LED Operator Display		Name	Page
oPE01	oPE01	Drive Unit Setting Error	213
oPE02	oPE02	Parameter Setting Range Error	213
oPE03	oPE03	Multi-Function Input Setting Error	213

LED Operator Display		Name	Page
oPE08	oPE08	Parameter Selection Error	215
oPE09	oPE09	PID Control Selection Error	216
oPE10	oPE10	V/f Data Setting Error	216

LED Operator Display		Name	Page
oPE04	oPE04	Terminal Board Mismatch Error	214
oPE05	oPE05	Run Command Selection Error	215
oPE07	oPE07	Multi-Function Analog Input Selection Error	215

LED Operator Display		Name	Page
oPE11	oPE11	Carrier Frequency Setting Error	216
oPE13	oPE13	Pulse Train Monitor Selection Error	217
oPE14	oPE14	Application setup error	217

■ Auto-Tuning Errors

Table 5.7 Auto-Tuning Error Displays

LED Operator Display		Name	Page
Er-01	Er-01	Motor Data Error	218
Er-02	Er-02	Alarm	218
Er-03	Er-03	STOP button Input	218
Er-04	Er-04	Line-to-Line Resistance Error	219
Er-05	Er-05	No-Load Current Error	219
Er-08	Er-08	Rated Slip Error	219

LED Operator Display		Name	Page
Er-09	Er-09	Acceleration Error	219
Er-11	Er-11	Motor Speed Error	220
Er-12	Er-12	Current Detection Error	220
End1	End1	Excessive V/f Setting	220
End2	End2	Motor Iron Core Saturation Coefficient Error	220
End3	End3	Rated Current Setting Alarm	221

5.4 Fault Detection

◆ Fault Displays, Causes, and Possible Solutions

Table 5.8 Detailed Fault Displays, Causes, and Possible Solutions

LED Operator Display		Fault Name
bUS	bUS	Option Communication Error
		• After establishing initial communication, the connection was lost. • Only detected when the run command frequency reference is assigned to an option card.
Cause		**Possible Solution**
No signal received from the PLC.		• Check for faulty wiring. • Correct the wiring. • Check for loose wiring and short circuits. Repair as needed.
The communication cable is faulty or a short circuit exists.		
A communications data error occurred due to noise.		• Check the various options available to minimize the effects of noise. • Counteract noise in control circuit, main circuit, and ground wiring. • Ensure that other equipment such as switches or relays do not cause noise and use surge suppressors if required. • Use cables recommended by OYMC or another type of shielded line. Ground the shield on the controller side or on the drive input power side. • Separate all wiring for communications devices from drive input power lines. Install a noise filter to the input side of the drive input power.
The option card is damaged.		• Replace the option card if there are no problems with the wiring and the error continues to occur.
The option card is not properly connected to the drive.		• The connector pins on the option card are not properly lined up with the connector pins on the drive. • Reinstall the option card.
LED Operator Display		**Fault Name**
CE	CE	MEMOBUS/Modbus Communication Error
		Control data was not received for the CE detection time set to H5-09.
Cause		**Possible Solution**
Faulty communications wiring, or a short circuit exists.		• Check for faulty wiring. • Correct the wiring. • Check for loose wiring and short circuits. Repair as needed.
A communications data error occurred due to noise.		• Check the various options available to minimize the effects of noise. • Counteract noise in control circuit, main circuit, and ground wiring. • Ensure that other equipment such as switches or relays do not cause noise and use surge suppressors if required. • Use OYMC-recommended cables, or another type of shielded line. Ground the shield on the controller side or on the drive input power side. • Separate all wiring for communications devices from drive input power lines. Install a noise filter to the input side of the drive input power.

LED Operator Display		Fault Name
CF	CF	Control Fault
		A torque limit was reached continuously for three seconds or longer during a ramp to stop while in Open Loop Vector Control.
Cause		**Possible Solution**
Motor parameters are not set properly.		Check the motor parameter settings and repeat Auto-Tuning.
Torque limit is too low.		Set the torque limit to the most appropriate setting (L7-01 through L7-04).
Load inertia is too big.		• Adjust the deceleration time (C1-02, -04, -06, -08). • Set the frequency to the minimum value and interrupt the run command when the drive finishes decelerating.
LED Operator Display		**Fault Name**
CoF	CoF	Current Offset Fault
		There is a problem with the current detection circuit or the drive attempted to start a coasting PM motor.
Cause		**Possible Solution**
While the drive automatically adjusted the current offset, the calculated value exceeded the allowable setting range. This problem may occur when attempting to restart a coasting PM motor.		Enable Speed Search at start (b3-01 = 1). Use the multi-function terminals to execute External Speed Search 1 and 2 (H1-□□. = 61 or 62). **NOTE:** When using a PM motor, both External Speed Search 1 and 2 perform the same operation.
LED Operator Display		**Fault Name**
CPF02	CPF02	A/D Conversion Error
		An A/D conversion error occurred.
Cause		**Possible Solution**
Control circuit is damaged.		Cycle power to the drive. If the problem continues, replace the drive.
Control circuit terminals have shorted out (+V, AC).		• Check for wiring errors along the control circuit terminals. • Correct the wiring.
		Check the resistance of the speed potentiometer and related wiring.
Control terminal input current has exceeded allowable levels.		• Check the input current. • Reduce the current input to control circuit terminal (+V) to 20 mA.
LED Operator Display		**Fault Name**
CPF03	CPF03	PWM Data Error
		There is a problem with the PWM data.
Cause		**Possible Solution**
Drive hardware is damaged.		Replace the drive.
LED Operator Display		**Fault Name**
CPF06	CPF06	EEPROM Data Error
		There is an error in the data saved to EEPROM.

Cause		Possible Solution
Control circuit is damaged.		Cycle power to the drive. If the problem continues, replace the drive.
The power supply was switched off when parameter were written (e.g. using a communications option card).		Reinitialize the drive (A1-03).
LED Operator Display		**Fault Name**
CPF07	CPF07	Terminal Board Communications Error
		A communication error occurred at the terminal board.
Cause		**Possible Solution**
There is a fault connection between the terminal board and control board.		Turn the power off and reconnect the control circuit terminals.
LED Operator Display		**Fault Name**
CPF08	CPF08	EEPROM Serial Communication Fault
		EEPROM communications are not functioning properly.
Cause		**Possible Solution**
Terminal board or control board is not connected properly.		Turn the power off and check the control terminal connections.
LED Operator Display		**Fault Name**
CPF11	CPF11	RAM Fault
Cause		**Possible Solution**
Hardware is damaged.		Replace the drive.
LED Operator Display		**Fault Name**
CPF12	CPF12	FLASH Memory Fault
		Problem with the ROM (FLASH memory).
Cause		**Possible Solution**
Hardware is damaged.		Replace the drive.
LED Operator Display		**Fault Name**
CPF13	CPF13	Watchdog Circuit Exception
		Self-diagnostics problem.
Cause		**Possible Solution**
Hardware is damaged.		Replace the drive.

LED Operator Display		Fault Name
CPF 14	CPF14	Control Circuit Fault
		CPU error (CPU operates incorrectly due to noise, etc.)
Cause		**Possible Solution**
Hardware is damaged.		Replace the drive.
LED Operator Display		**Fault Name**
CPF 16	CPF16	Clock Fault
		Standard clock error.
Cause		**Possible Solution**
Hardware is damaged.		Replace the drive.
LED Operator Display		**Fault Name**
CPF 17	CPF17	Timing Fault
		A timing error occurred during an internal process.
Cause		**Possible Solution**
Hardware is damaged.		Replace the drive.
LED Operator Display		**Fault Name**
CPF 18	CPF18	Control Circuit Fault
		CPU error (CPU operates incorrectly due to noise, etc.)
Cause		**Possible Solution**
Hardware is damaged.		Replace the drive.
LED Operator Display		**Fault Name**
CPF 19	CPF19	Control Circuit Fault
		CPU error (CPU operates incorrectly due to noise, etc.)
Cause		**Possible Solution**
Hardware is damaged.		Replace the drive.
LED Operator Display		**Fault Name**
CPF20 or CPF21	CPF20 or CPF21	One of the following faults occurred: RAM fault, FLASH memory error, watchdog circuit exception, clock error
		• RAM fault. • FLASH memory error (ROM error). • Watchdog circuit exception (self-diagnostic error). • Clock error.
Cause		**Possible Solution**
Hardware is damaged.		Replace the drive.
LED Operator Display		**Fault Name**
CPF22	CPF22	A/D Conversion Fault
		A/D conversion error.

Cause		Possible Solution
Control circuit is damaged.		• Cycle power to the drive. *Refer to Diagnosing and Resetting Faults on page 222*. • If the problem continues, replace the drive.
LED Operator Display		**Fault Name**
CPF23	CPF23	PWM Feedback Fault
		PWM feedback error.
Cause		**Possible Solution**
Hardware is damaged.		Replace the drive.
LED Operator Display		**Fault Name**
CPF24	CPF24	Drive Capacity Signal Fault
		Entered a capacity that does not exist. (Checked when the drive is powered up.)
Cause		**Possible Solution**
Hardware is damaged.		Replace the drive.
LED Operator Display		**Fault Name**
dEv	dEv	Speed Deviation (for Simple V/f with PG)
		According to the pulse input (RP), the speed deviation is greater than the setting in F1-10 for longer than the time set to F1-11.
Cause		**Possible Solution**
Load is too heavy.		Reduce the load.
Acceleration and deceleration times are set too short.		Increase the acceleration and deceleration times (C1-01 through C1-08).
The load is locked up.		Check the machine.
Parameters are not set appropriately.		Check the settings of parameters F1-10 and F1-11.
Motor brake engaged.		Ensure the motor brake releases properly.
LED Operator Display		**Fault Name**
dWFL	dWFL	FBD's Fault
dWAL	dWAL	FBD's fault
Cause		**Possible Solution**
Fault output by a FBD's program		• Correct whatever caused the fault to occur.
LED Operator Display		**Fault Name**
EF0	EF0	Option Card External Fault
		An external fault condition is present.
Cause		**Possible Solution**
An external fault was received from the PLC with F6-03 = 3 "alarm only" (the drive continued to run).		• Remove the cause of the external fault. • Remove the external fault input from the PLC.

Problem with the PLC program.		Check the PLC program and correct problems.
LED Operator Display		**Fault Name**
EF1	EF1	External Fault (input terminal S1)
		External fault at multi-function input terminal S1.
EF2	EF2	External Fault (input terminal S2)
		External fault at multi-function input terminal S2.
EF3	EF3	External Fault (input terminal S3)
		External fault at multi-function input terminal S3.
EF4	EF4	External Fault (input terminal S4)
		External fault at multi-function input terminal S4.
EF5	EF5	External Fault (input terminal S5)
		External fault at multi-function input terminal S5.
EF6	EF6	External Fault (input terminal S6)
		External fault at multi-function input terminal S6.
Cause		**Possible Solution**
An external device has tripped an alarm function.		Remove the cause of the external fault and reset the fault.
Wiring is incorrect.		• Ensure the signal lines have been connected properly to the terminals assigned for external fault detection (H1-☐☐ = 20 to 2F). • Reconnect the signal line.
Incorrect setting of multi-function contact inputs.		• Check if the unused terminals set for H1-☐☐ = 20 to 2F (External Fault). • Change the terminal settings.
LED Operator Display		**Fault Name**
Err	Err	EEPROM Write Error
		Data does not match the EEPROM being written to.
Cause		**Possible Solution**
-		• Press the ENTER button. • Correct the parameter settings. • Cycle power to the drive. ***Refer to Diagnosing and Resetting Faults on page 222***.
LED Operator Display		**Fault Name**
FbH	FbH	Excessive PID Feedback
		PID feedback input is greater than the level set b5-36 for longer than the time set to b5-37. To enable fault detection, set b5-12 = “2” or “5”.
Cause		**Possible Solution**
Parameters are not set appropriately.		Check the settings of parameters b5-36 and b5-37.
Wiring for PID feedback is incorrect.		Correct the wiring.

There is a problem with the feedback sensor.	• Check the sensor on the control side. • Replace the sensor if damaged.
LED Operator Display	**Fault Name**
FbL	PID Feedback Loss
	This fault occurs when PID Feedback Loss Detection is programmed to fault (b5-12 = 2) and the PID Feedback < PID Feedback Loss Detection Level (b5-13) for the PID Feedback Loss Detection Time (b5-14).
Cause	**Possible Solution**
Parameters are not set appropriately.	Check the settings of parameters b5-13 and b5-14.
Wiring for PID feedback is incorrect.	Correct the wiring.
There is a problem with the feedback sensor.	Check the sensor on the controller side. If damaged, replace the sensor.
LED Operator Display	**Fault Name**
GF	Ground Fault
	• Current shorted to ground exceeded 50% of rated current on output side of the drive. • Setting L8-09 to 1 enables ground fault detection in models 5.5 kW or larger.
Cause	**Possible Solution**
Motor insulation is damaged.	• Check the insulation resistance of the motor. • Replace the motor.
A damaged motor cable is creating a short circuit.	• Check the motor cable. • Remove the short circuit and turn the power back on.
	• Check the resistance between the cable and the ground terminal ⏚. • Replace the cable.
The leakage current at the drive output is too high.	• Reduce the carrier frequency. • Reduce the amount of stray capacitance.
The drive started to run during Current Offset Fault or while coasting to a stop.	• The value set exceeds the allowable setting range while the drive automatically adjusts the current offset (this happens only attempting to restart a PM motor that is coasting to stop). • Enable Speed Search at start (b3-01 = 1). • Perform Speed Search 1 or 2 (H1-xx = 61 or 62) via one of the external terminals. Note: Speed Search 1 and 2 are the same when using PM OLV.
Hardware problem.	• Replace the drive.
LED Operator Display	**Fault Name**
LF	Output Phase Loss
	• Phase loss on the output side of the drive. • Phase Loss Detection is enabled when L8-07 is set to “1” or “2”.
Cause	**Possible Solution**
The output cable is disconnected.	• Check for wiring errors and ensure the output cable is connected properly. • Correct the wiring.

The motor winding is damaged.	• Check the resistance between motor lines. • Replace the motor if the winding is damaged.
The output terminal is loose.	• Apply the tightening torque specified in this manual to fasten the terminals. *Refer to Wire Size on page 68*.
The motor being used is less than 5% of the drive rated current.	Check the drive and motor capacities.
An output transistor is damaged.	Replace the drive.
A single phase motor is being used.	The drive being used cannot operate a single phase motor.
LED Operator Display	**Fault Name**
LF2	Output current imbalance
	One or more of the phases in the output current is lost.
Cause	**Possible Solution**
Phase loss has occurred on the output side of the drive.	• Check for faulty wiring or poor connections on the output side of the drive. • Correct the wiring.
Terminal wires on the output side of the drive are loose.	Apply the tightening torque specified in this manual to fasten the terminals. *Refer to Wire Size on page 68*.
No signal displays from the gate driver board.	Replace the drive. Contact OYMC or an OYMC representative for assistance.
Motor impedance or motor phases are uneven.	• Measure the line-to-line resistance for each motor phase. Ensure all values are the same. • Replace the motor. Contact OYMC or an OYMC representative for assistance.
LED Operator Display	**Fault Name**
oC	Overcurrent
	Drive sensors have detected an output current greater than the specified overcurrent level.
Cause	**Possible Solution**
The motor has been damaged due to overheating or the motor insulation is damaged.	Check the insulation resistance. Replace the motor.
One of the motor cables has shorted out or there is a grounding problem.	• Check the motor cables. • Remove the short circuit and power the drive back up.
	• Check the resistance between the motor cables and the ground terminal ⏚. • Replace damaged cables.
The load is too heavy.	• Measure the current flowing into the motor. • Replace the drive with a larger capacity unit if the current value exceeds the rated current of the drive. • Determine if there is sudden fluctuation in the current level. • Reduce the load to avoid sudden changes in the current level or switch to a larger drive.

The acceleration or deceleration times are too short.	• Calculate the torque needed during acceleration relative to the load inertia and the specified acceleration time. • If the right amount of torque cannot be set, make the following changes: • Increase the acceleration time (C1-01, -03, -05, -07) • Increase the S-curve characteristics (C2-01 through C2-04) • Increase the capacity of the drive.
The drive is attempting to operate a specialized motor or a motor larger than the maximum size allowed.	• Check the motor capacity. • Ensure that the rated capacity of the drive is greater than or equal to the capacity rating found on the motor nameplate.
Magnetic contactor (MC) on the output side of the drive has turned on or off.	Set up the operation sequence so that the MC is not tripped while the drive is outputting current.
V/f setting is not operating as expected.	• Check the ratios between the voltage and frequency. • Set parameter E1-04 through E1-10 appropriately. Set E3-04 through E3-10 when using a second motor. • Lower the voltage if it is too high relative to the frequency.
Excessive torque compensation.	• Check the amount of torque compensation. • Reduce the torque compensation gain (C4-01) until there is no speed loss and less current.
Drive fails to operate properly due to noise interference.	• Review the possible solutions provided for handling noise interference. • Review the section on handling noise interference and check the control circuit lines, main circuit lines and ground wiring.
Overexcitation gain is set too high.	• Check if fault occurs simultaneously to overexcitation function operation. • Consider motor flux saturation and reduce the value of n3-13 (Overexcitation Deceleration Gain).
Run command applied while motor was coasting.	• Enable Speed Search at start (b3-01 = “1”). • Program the Speed Search command input through one of the multi-function contact input terminals (H1-□□ = “61” or “62”).
The wrong motor code has been entered for PM Open Loop Vector (Yaskawa motors only).	Enter the correct motor code to E5-01 to indicate that a PM motor is connected.
The motor control method and motor do not match.	• Check which motor control method the drive is set to (A1-02). • For IM motors, set A1-02 = “0” or “2”. • For PM motors, set A1-02 = “5”.
The motor cable is too long.	Use a larger drive.
LED Operator Display	**Fault Name**
oFA00	Option Card Fault (Port A)
	The option card is incompatible with the drive.
Cause	**Possible Solution**
The option card is incompatible with the drive.	Use a compatible option card.
LED Operator Display	**Fault Name**
oFA01	Option Card Fault (Port A)
	Replace the option card.

Cause		Possible Solution
The option card is not connected properly to the drive.		Turn the power off and reconnect the option card.
LED Operator Display		**Fault Name**
oFA03	oFA03	Option Card Fault (port A)
		Option card self-diagnostic error
oFA04	oFA04	Option Card Fault (port A)
		An error occurred attempting to write to the option card memory.
oFA30 thru oFA43	oFA30 thru oFA43	Option Card Fault (port A)
		Communication ID error
Cause		**Possible Solution**
Option card or hardware is damaged.		Replace the option card. Contact OYMC or an OYMC representative for consultation.
LED Operator Display		**Fault Name**
oH	oH	Heatsink Overheat
		The temperature of the heatsink exceeded the value set to L8-02 (90-100°C). Default value for L8-02 is determined by drive capacity (o2-04).
Cause		**Possible Solution**
Surrounding temperature is too high.		• Check the temperature surrounding the drive. Verify temperature is within drive specifications. • Improve the air circulation within the enclosure panel. • Install a fan or air conditioner to cool the surrounding area. • Remove anything near the drive that might be producing excessive heat.
Load is too heavy.		• Measure the output current. • Decrease the load. • Lower the carrier frequency (C6-02).
Internal cooling fan is stopped.		• Replace the cooling fan. *Refer to Cooling Fan Replacement on page 250*. • After replacing the drive, reset the cooling fan maintenance parameter (o4-03 = “0”).
LED Operator Display		**Fault Name**
oH1	oH1	Overheat 1 (Heatsink Overheat)
		The temperature of the heatsink has exceeded the value set to L8-02 (100-110°C). Default value for L8-02 is determined by drive capacity (o2-04).
Cause		**Possible Solution**
Surrounding temperature is too hot.		• Check the temperature surrounding the drive. • Improve the air circulation within the enclosure panel. • Install a fan or air conditioner to cool the surrounding area. • Remove anything near the drive that might be producing excessive heat.
Load is too heavy.		• Measure the output current. • Reduce the load. • Lower the carrier frequency (C6-02).

The internal cooling fan has reached its performance life or has malfunctioned.	• Check the maintenance time for the cooling fan (U4-04). • If U4-04 exceeds 90%, replace the cooling fan. *Refer to Cooling Fan Replacement on page 250*. • After replacing fan, reset the fan maintenance time (o4-03 = "0").
Current flowing to control circuit terminal +V exceeded the tolerance level.	• Check the current level of the terminal. • Set the current to the control circuit terminal to be 20 mA or less.
LED Operator Display	**Fault Name**
oH3	Motor Overheat Alarm (PTC Input)
oH3	• The motor overheat signal to analog input terminal A1 or A2 exceeded the alarm detection level. • Detection requires multi-function analog input H3-02 or H3-10 be set to "E".
Cause	**Possible Solution**
Motor has overheated	• Check the size of the load, the accel/decel times and the cycle times. • Decrease the load. • Increase the acceleration and deceleration times (C1-01 through C1-08).
	• Adjust the preset V/f pattern (E1-04 through E1-10). This will mainly involve reducing E1-08 and E1-10. • Be careful not to lower E1-08 and E1-10 excessively, as this reduces load tolerance at low speeds.
	• Check the motor-rated current. • Enter the motor-rated current as indicated on the motor nameplate (E2-01). • Ensure the motor cooling system is operating normally. • Repair or replace the motor cooling system.
LED Operator Display	**Fault Name**
oH4	Motor Overheat Fault (PTC Input)
oH4	• The motor overheat signal to analog input terminal A1 or A2 exceeded the fault detection level. • Detection requires that multi-function analog input H3-02 or H3-10 = "E".
Cause	**Possible Solution**
Motor has overheated.	• Check the size of the load, the accel/decel times and the cycle times. • Decrease the load. • Increase the acceleration and deceleration times (C1-01 through C1-08).
	• Adjust the preset V/f pattern (E1-04 through E1-10). This will mainly involve reducing E1-08 and E1-10.Be careful not to lower E1-08 and E1-10 excessively because this reduces load tolerance at low speeds
	• Check the motor-rated current. • Enter the motor-rated current as indicated on the motor nameplate (E2-01). • Ensure the motor cooling system is operating normally. • Repair or replace the motor cooling system.
LED Operator Display	**Fault Name**
oL1	Motor Overload
oL1	The electrothermal sensor tripped overload protection.

Cause	Possible Solution
Load is too heavy.	Reduce the load.
Cycle times are too short during acceleration and deceleration.	Increase the acceleration and deceleration times (C1-01 through C1-08).
• Drive overloaded at low speeds. • Overload may occur at low speeds when using a general-purpose motor, even if operating within the rated current limitation.	• Reduce the load. • Increase the speed. • If the drive is supposed to operate at low speeds, either increase the motor capacity or use a motor specifically designed to operate with the drive.
Although a special type of motor is being used, the motor protection selection is set for a general-purpose motor (L1-01 = 1).	Set L1-01 = “2”.
Voltage is too high for the V/f characteristics.	• Adjust the user set V/f patterns (E1-04 through E1-10). Parameters E1-08 and E1-10 may need to be reduced. • If E1-08 and E1-10 are set too high, there may be very little load tolerance at low speed.
The wrong motor-rated current is set to E2-01.	• Check the motor-rated current. • Enter the value written on the motor nameplate to parameter E2-01.
The maximum frequency for the drive input power is set too low.	• Check the rated frequency indicated on the motor nameplate. • Enter the rated frequency to E1-06 (Base Frequency).
Multiple motors are running off the same drive.	Disable the Motor Protection function (L1-01 = “0”) and install a thermal relay to each motor.
The electrical thermal protection characteristics and motor overload characteristics do not match.	• Check the motor characteristics. • Correct the value set to L1-01 (Motor Protection Function). • Install an external thermal relay.
The electrical thermal relay is operating at the wrong level.	• Check the current rating listed on the motor nameplate. • Check the value set for the motor-rated current (E2-01).
Cause	**Possible Solution**
Overexcitation current is enabled.	• Overexcitation is a potential serious danger to the motor. • Reduce the excitation deceleration gain (n3-13). • Set L3-04 (Stall Prevention during Deceleration) to a value other than 4. • Disable overexcitation (n3-23 = “0”).
Speed Search related parameters are not set to the proper values.	• Check values set to Speed Search related parameters. • Adjust the Speed Search current and Speed Search deceleration times (b3-02 and b3-03 respectively). • After Auto-Tuning, enable Speed Estimation Type Search (b3-24 = “1”).
Output current fluctuation due to input phase loss.	Check the power supply for phase loss.
LED Operator Display	**Fault Name**
oL2	Drive Overload
	The thermal sensor of the drive triggered overload protection.
Cause	**Possible Solution**
Load is too heavy.	Reduce the load.

Cycle times are too short during acceleration and deceleration.	Increase the settings for the acceleration and deceleration times (C1-01 through C1-08).
Voltage is too high for the V/f characteristics.	• Adjust the preset V/f pattern (E1-04 through E1-10). This will mainly involve reducing E1-08 and E1-10. • Be careful not to lower E1-08 and E1-10 excessively because this reduces load tolerance at low speeds.
Drive capacity is too small.	Replace the drive with a larger model.
Overload occurred when operating at low speeds.	• Reduce the load when operating at low speeds. • Replace the drive with a model that is one frame size larger. • Lower the carrier frequency (C6-02).
Excessive torque compensation.	Reduce the torque compensation gain (C4-01) until there is no speed loss but less current.
Speed Search related parameters are not set correctly.	• Check the settings for all Speed Search related parameters. • Adjust the current used during Speed Search and the Speed Search deceleration time (b3-03 and b3-02 respectively). • After Auto-Tuning the drive, enable the Speed Search Estimation Type (b3-24 = "1").
Output current fluctuation due to input phase loss.	Check the power supply for phase loss.
LED Operator Display	**Fault Name**
oL3	Overtorque Detection 1
	The current has exceeded the value set for torque detection (L6-02) for longer than the allowable time (L6-03).
Cause	**Possible Solution**
Parameter settings are not appropriate for the type of load.	Check the settings of parameters L6-02 and L6-03.
There is a fault on the machine side (e.g., the machine is locked up).	Check the status of the load. Remove the cause of the fault.
LED Operator Display	**Fault Name**
oL4	Overtorque Detection 2
	The current has exceeded the value set for Overtorque Detection 2 (L6-05) for longer than the allowable time (L6-06).
Cause	**Possible Solution**
Parameter settings are not appropriate for the type of load.	Check the settings of parameters L6-05 and L6-06.
There is a fault on the machine side (e.g., the machine is locked up).	Check the status of the load. Remove the cause of the fault.
LED Operator Display	**Fault Name**
oL7	High-Slip Braking OL
	The output frequency stayed constant for longer than the time set in n3-04 during High-slip Braking.

Cause		Possible Solution
Excessive load inertia.		• Reduce deceleration times using parameters C1-02, -04, -06 and -08 in applications that do not use High-slip Braking. • Use a braking resistor to shorten deceleration time.
Motor is driven by the load.		
Something on the load side is restricting deceleration.		
The overload time during High-slip Braking is too short.		• Increase parameter n3-04 (High-slip Braking Overload Time). • Install a thermal relay and increase the parameter setting of n3-04 to the maximum value.
LED Operator Display		**Fault Name**
oPr	oPr	Digital Operator Connection Fault
		• The LCD operator has been disconnected from the drive. **Note:** An oPr fault will occur when all of the following conditions are true: • Output is interrupted when the operator is disconnected (o2-06 = 1). • The run command is assigned to the LCD operator (b1-02 = 0 and LOCAL has been selected).
Cause		**Possible Solution**
LCD operator is not properly connected to the drive.		• Check the connection between the LCD operator and the drive. • Replace the cable if damaged. • Turn off the drive input power and disconnect the LCD operator. Next reconnect the operator and turn the drive input power back on.
LED Operator Display		**Fault Name**
oS	oS	Overspeed (Simple V/f with PG)
		Pulse input (RP) indicates that motor speed feedback exceeded F1-08 setting.
Cause		**Possible Solution**
Overshoot or undershoot is occurring.		• Adjust the gain by using the pulse train input parameters (H6-02 through H6-05). • Increase the settings for C5-01 (Speed Control Proportional Gain 1) and reduce C5-02 (Speed Control Integral Time 1).
Incorrect PG pulse settings.		Set the H6-02 (Pulse Train Input Scaling) = 100%, the number of pulses during maximum motor revolutions.
Inappropriate parameter settings.		Check the setting for the overspeed detection level and the overspeed detection time (F1-08 and F1-09).
LED Operator Display		**Fault Name**
ov	ov	Overvoltage
		Voltage in the DC bus has exceeded the overvoltage detection level. For 200 V class: approximately 410 V For 400 V class: approximately 820 V (740 V when E1-01 is less than 400)
Cause		**Possible Solution**
Deceleration time is too short and regenerative energy flows from the motor into the drive.		• Increase the deceleration time (C1-02, -04, -06, -08). • Install a braking resistor or a dynamic braking resistor unit. • Enable stall prevention during deceleration (L3-04 = “1”). Stall prevention is enabled as the default setting.

Acceleration time is too short.	• Check if sudden drive acceleration triggers an overvoltage alarm. • Increase the acceleration time. • Use longer S-curve acceleration and deceleration times.
Excessive braking load.	The braking torque was too high, causing regenerative energy to charge the DC bus. Reduce the braking torque, use a braking option, or lengthen decel time.
Surge voltage entering from the drive input power.	Install a DC reactor. **Note:** Voltage surge can result from thyristor convertor and phase advancing capacitor using same drive main input power supply.
Ground fault in the output circuit causing the DC bus capacitor to overcharge.	• Check the motor wiring for ground faults. • Correct grounding shorts and turn the power back on.
Improper Setting of Speed Search related parameters. (Includes Speed Search after a momentary power loss and after a fault restart.)	• Check the settings for Speed Search related parameters. • Enable Speed Search Retry function (b3-19 greater than or equal to 1 to 10). • Adjust the current level during Speed Search and the deceleration time (b3-02 and b3-03 respectively). • Perform Line-to-Line Resistance Auto-Tuning and then enable Speed Estimation Type Speed Search (b3-24 = “1”).
Excessive regeneration when overshoot occurs after acceleration.	Enable the Overvoltage Suppression function (L3-11 = “1”). Lengthen the S-curve at acceleration end.
Drive input power voltage is too high.	• Check the voltage. • Lower drive input power voltage within the limits listed in the specifications.
The dynamic braking transistor is damaged.	Replace the drive.
The braking transistor is wired incorrectly.	• Check braking transistor wiring for errors. • Properly rewire the braking resistor device.
Drive fails to operate properly due to noise interference.	• Review the list of possible solutions provided for controlling noise. • Review the section on handling noise interference and check the control circuit lines, main circuit lines and ground wiring.
Load inertia has been set incorrectly.	• Check the load inertia settings when using KEB, overvoltage suppression or Stall Prevention during deceleration. • Adjust L3-25 (Load Inertia Ratio) in accordance with the load.
Braking function is being used in PM Open Loop Vector Control.	Connect a braking resistor.
Motor hunting occurs.	• Adjust the parameters that control hunting. • Set the hunting prevention gain (n1-02). • Adjust the AFR time constant (n2-02 and n2-03) when in OLV Control. • Use parameters n8-45 (PM Speed Feedback Detection Suppression Gain) and n8-47 (Pull-In Current Compensation Time Constant).
LED Operator Display	**Fault Name**
PF	Input Phase Loss Drive input power has an open phase or has a large imbalance of voltage between phases. Detected when L8-05 = 1 (enabled).
Cause	**Possible Solution**
There is phase loss in the drive input power.	• Check for wiring errors in the main circuit drive input power. • Correct the wiring.

There is loose wiring in the drive input power terminals.	• Ensure the terminals are tightened properly. • Apply the tightening torque specified in this manual to fasten the terminals. *Refer to Wire Gauges and Tightening Torque on page 59*
There is excessive fluctuation in the drive input power voltage.	• Check the voltage from the drive input power. • Review the possible solutions for stabilizing the drive input power. • Disable Input Phase Loss Detection (L8-05 = "0"). PF is detected if DC bus ripple is too high. If it is disabled, there is no fault but the ripple is still too high, thereby the capacitors are stressed more and lose lifetime.
There is poor balance between voltage phases.	• Stabilize drive input power or disable phase loss detection.
The main circuit capacitors are worn.	• Check the maintenance time for the capacitors (U4-05). • Replace the drive if U4-05 is greater than 90%.
	• Check for anything wrong with the drive input power. • If nothing is wrong with the drive input power, try the following solutions if the alarm continues: • Disable Input Phase Loss Protection selection (L8-05 = "0"). PF is detected if DC bus ripple is too high. If it is disabled, there is no fault but the ripple is still too high, thereby the capacitors are stressed more and lose lifetime. • Replace the drive.
LED Operator Display	**Fault Name**
PGo	PG Disconnect (for Simple V/f with PG)
	No PG pulses are received for longer than the time set to F1-14.
Cause	**Possible Solution**
Pulse input (RP) is disconnected.	Reconnect the pulse input (RP).
Pulse input (RP) wiring is wrong.	Correct the wiring.
Motor brake engaged.	Ensure the motor brake releases properly.
LED Operator Display	**Fault Name**
rH	Braking Resistor Overheat
	Braking resistor protection was triggered. Fault detection is enabled when L8-01 = 1 (disabled as a default).
Cause	**Possible Solution**
Deceleration time is too short and excessive regenerative energy is flowing back into the drive.	• Check the load, deceleration time and speed. • Reduce the load. • Increase the acceleration and deceleration times (C1-01 through C1-08). • Replace the braking option with a larger device that can handle the power that is discharged.
Excessive braking inertia.	Recalculate braking load and braking power. Then try reducing the braking load and checking the braking resistor settings and improve braking capacity.
The proper braking resistor has not been installed.	• Check the specifications and conditions for the braking resistor device. • Select the optimal braking resistor.
Note: The magnitude of the braking load trips the braking resistor overheat alarm, NOT the surface temperature. Using the braking resistor more frequently than its rating trips the alarm even when the braking resistor surface is not very hot.	

LED Operator Display		Fault Name
rr	rr	Dynamic Braking Transistor
		The built-in dynamic braking transistor failed.
Cause		**Possible Solution**
The braking transistor is damaged.		• Cycle power to the drive and check if the fault reoccurs. *Refer to Diagnosing and Resetting Faults on page 222*. • Replace the drive if the fault continues.
The control circuit is damaged.		
LED Operator Display		**Fault Name**
SEr	SEr	Too Many Speed Search Restarts
		The number of speed search restarts exceeded the number set to b3-19.
Cause		**Possible Solution**
Speed Search parameters are set to the wrong values.		• Reduce the detection compensation gain during Speed Search (b3-10). • Increase the current level when attempting Speed Search (b3-17). • Increase the detection time during Speed Search (b3-18). • Repeat Auto-Tuning.
The motor is coasting in the opposite direction of the run command.		Enable Bi-directional Speed Search (b3-14 = "1").
LED Operator Display		**Fault Name**
STO	STO	Pull-Out Detection
		Motor pull-out has occurred.
Cause		**Possible Solution**
The wrong motor code has been set (Yaskawa motors only).		• Enter the correct motor code for the PM being used into E5-01. • For special-purpose motors, enter the correct data to all E5 parameters according to the Test Report provided for the motor.
Load is too heavy.		• Increase the value set to n8-55 (Load Inertia for PM). • Increase the value set to n8-51 (Pull-In Current during Accel/Decel for PM). • Reduce the load. • Increase the motor or drive capacity.
Load inertia is too heavy.		Increase n8-55 (Load Inertia for PM).
Acceleration and deceleration times are too short.		• Increase the acceleration and deceleration times (C1-01 through C1-08). • Increase the S-curve acceleration and deceleration times (C2-01).
LED Operator Display		**Fault Name**
UL3	UL3	Undertorque Detection 1
		The current has fallen below the minimum value set for torque detection (L6-02) for longer than the allowable time (L6-03).
Cause		**Possible Solution**
Parameter settings are not appropriate for the type of load.		Check the settings of parameters L6-02 and L6-03.
There is a fault on the machine side.		Check the load for any problems.

LED Operator Display		Fault Name
UL4	UL4	Undertorque Detection 2
		The current has fallen below the minimum value set for torque detection (L6-05) for longer than the allowable time (L6-06).
Cause		**Possible Solution**
Parameter settings are not appropriate for the type of load.		Check the settings of parameters L6-05 and L6-06.
There is a fault on the machine side.		Check the load for any problems.
LED Operator Display		**Fault Name**
UL5	UL5	Mechanical Weakening Detection 2
		The operation conditions matched the conditions set to L6-08.
Cause		**Possible Solution**
Undertorque was detected and matched the condition of mechanical loss detection operation selection (L6-08).		Check the load side for any problems.
LED Operator Display		**Fault Name**
Uv1	Uv1	DC Bus Undervoltage
		One of the following conditions occurred while the drive was stopped: • Voltage in the DC bus fell below the undervoltage detection level (L2-05). • For 200 V class: approximately 190 V (160 V for single phase drives) • For 400 V class: approximately 380 V (350 V when E1-01 is less then 400) The fault is output only if L2-01 = 0 or L2-01 = 1 and the DC bus voltage is under L1-05 for longer than L2-02.
Cause		**Possible Solution**
Input power phase loss.		• The main circuit drive input power is wired incorrectly. • Correct the wiring.
One of the drive input power wiring terminals is loose.		• Ensure there are no loose terminals. • Apply the tightening torque specified in this manual to fasten the terminals. *Refer to Wire Size on page 68*
There is a problem with the voltage from the drive input power.		• Check the voltage. • Correct the voltage to within range listed in drive input power specifications.
The power has been interrupted.		Correct the drive input power.
Drive internal circuitry has become worn.		• Check the maintenance time for the capacitors (U4-05). • Replace the drive if U4-05 exceeds 90%.
The drive input power transformer is not large enough and voltage drops after switching on power.		Check the capacity of the drive input power transformer.
Air inside the drive is too hot.		Check the drive's internal temperature.
Problem with the CHARGE indicator.		Replace the drive.

LED Operator Display		Fault Name
Uv2	Uv2	Control Power Supply Voltage Fault
		Voltage is too low for the control drive input power.
Cause		**Possible Solution**
L2-02 changed from its default value in drive that is 7.5 kW or smaller without installing a Momentary Power Loss Ride-Thru.		Correct parameter L2-02 setting or install optional Momentary Power Loss Ride-Thru unit.
The wiring for the control power supply is damaged.		• Cycle power to the drive. Check if the fault reoccurs. • Replace the drive if the fault continues to occur.
Internal circuitry is damaged.		• Cycle power to the drive. Check if the fault reoccurs. • Replace the drive if the fault continues to occur.
LED Operator Display		**Fault Name**
Uv3	Uv3	Undervoltage 3 (Inrush Prevention Circuit Fault)
		The inrush prevention circuit has failed.
Cause		**Possible Solution**
The contactor on the inrush prevention circuit is damaged.		• Cycle power to the drive. Check if the fault reoccurs. • Replace the drive if the fault continues to occur. • Check monitor U4-06 for the performance life of the inrush prevention circuit. • Replace the drive if U4-06 exceeds 90%.

5.5 Alarm Detection

Alarms are drive protection functions that do not operate the fault contact. The drive will return to original status when the cause of the alarm has been removed.

During an alarm condition, the Digital Operator display flashes and an alarm output is generated at the multi-function outputs (H2-01 to H2-03), if programmed.

Investigate the cause of the alarm and refer to *Table 5.9* for the appropriate action.

◆ Alarm Codes, Causes, and Possible Solutions

Table 5.9 Alarm Codes, Causes, and Possible Solutions

LED Operator Display		Minor Fault Name	
bb	bb	Baseblock	
		Drive output interrupted as indicated by an external baseblock signal.	
Cause		**Possible Solutions**	**Minor Fault (H2-□□ = 10)**
External baseblock signal entered via multi-function input terminal (S1 to S6).		Check external sequence and baseblock signal input timing.	No output
LED Operator Display		**Minor Fault Name**	
bUS	bUS	Option Communication Error	
		• After initial communication was established, the connection was lost. • Assign a run command frequency reference to the option card.	
Cause		**Possible Solutions**	**Minor Fault (H2-□□ = 10)**
Connection is broken or master controller stopped communicating.		• Check for faulty wiring. • Correct the wiring. • Repair ground wiring or disconnected cables.	YES
Option card is damaged.		If there are no problems with the wiring and the fault continues to occur, replace the option card.	YES
The option card is not properly connected to the drive.		• The connector pins on the option card are not properly lined up with the connector pins on the drive. • Reinstall the option card.	YES

A data error occurred due to noise.		• Check options available to minimize the effects of noise. • Take steps to counteract noise in the control circuit wiring, main circuit lines and ground wiring. • Try to reduce noise on the controller side. • Use surge absorbers on magnetic contactors or other equipment causing the disturbance. • Use cables recommended by OYMC, or another type of shielded line. The shield should be grounded on the controller side or on the drive input power side. • All wiring for communications devices should be separated from drive input power lines. Install a noise filter to the input side of the drive input power.	YES
LED Operator Display		**Minor Fault Name**	
CALL	CALL	Serial Communication Transmission Error	
		Communication has not yet been established.	
Cause		**Possible Solutions**	**Minor Fault (H2-□□ = 10)**
Communications wiring is faulty, there is a short circuit, or something is not connected properly.		• Check for wiring errors. • Correct the wiring. • Remove and ground shorts and reconnect loose wires.	YES
Programming error on the master side.		Check communications at start-up and correct programming errors.	YES
Communications circuitry is damaged.		• Perform a self-diagnostics check. • Replace the drive if the fault continues to occurs.	YES
Terminal resistance setting is incorrect.		The terminal slave drive must have the internal terminal resistance switch set correctly. Place DIP switch S2 to the ON position. *Refer to MEMOBUS/Modbus Switch Settings on page 391*.	YES
LED Operator Display		**Minor Fault Name**	
CE	CE	MEMOBUS/Modbus Communication Error	
		Control data was not received correctly for two seconds.	
Cause		**Possible Solutions**	**Minor Fault (H2-□□ = 10)**
A data error occurred due to noise.		• Check options available to minimize the effects of noise. • Counteract noise in the control circuit wiring, main circuit lines and ground wiring. • Reduce noise on the controller side. • Use surge absorbers on magnetic contactors or other equipment causing the disturbance. • Use cables recommended by OYMC or another type of shielded line. The shield should be grounded on the controller side or on the drive input power side. • Separate all wiring for communications devices from drive input power lines. Install a noise filter to the input side of the drive input power.	YES

Communication protocol is incompatible.	• Check the H5 parameter settings as well as the protocol setting in the controller. • Ensure settings are compatible.	YES
The CE detection time (H5-09) is set shorter than the time required for a communication cycle to take place.	• Check the PLC. • Change the software settings in the PLC. • Set a longer CE detection time (H5-09).	YES
Incompatible PLC software settings or there is a hardware problem.	• Check the PLC. • Remove the cause of the error on the controller side.	YES
Communications cable is disconnected or damaged.	• Check the connector for a signal through the cable. • Replace the communications cable.	YES
LED Operator Display	**Minor Fault Name**	
CrST **CrST**	Can Not Reset	
	Fault reset was being executed when a run command was entered.	
Cause	**Possible Solutions**	**Minor Fault (H2-□□ = 10)**
Fault reset was being executed when a run command was entered.	• Ensure that a run command cannot be entered from the external terminals or option card during fault reset. • Turn off the run command.	YES
LED Operator Display	**Minor Fault Name**	
dEv dEv	Speed Deviation (for Simple V/f with PG)	
	According to the pulse input (RP), the speed deviation is greater than the setting in F1-10 for a time longer than the setting in F1-11.	
Cause	**Possible Solutions**	**Minor Fault Output (H2-□□ = 10)**
Load is too heavy	Reduce the load.	YES
Acceleration and deceleration times are set too short.	Increase the acceleration and deceleration times (C1-01 through C1-08).	YES
The load is locked up.	Check the machine.	YES
Parameter settings are inappropriate.	Check the settings of parameters F1-10 and F1-11.	YES
The motor brake engaged.	Ensure the brake releases properly.	YES

LED Operator Display		Minor Fault Name	
dnE	dnE	Drive Disabled	
Cause		**Possible Solutions**	**Minor Fault Output (H2-□□ = 10)**
"Drive Enable" is set to a multi-function contact input (H1-□□ = 6A) and that signal was switched off.		Check the operation sequence.	YES
LED Operator Display		**Minor Fault Name**	
EF	EF	Forward/Reverse Run Command Input Error	
		Both forward run and reverse run closed simultaneously for over 0.5 s.	
Cause		**Possible Solutions**	**Minor Fault Output (H2-□□ = 10)**
Sequence error		Check the forward and reverse command sequence and correct the problem. **Note:** When minor fault EF detected, motor ramps to stop.	YES
LED Operator Display		**Minor Fault Name**	
EF0	EF0	Option Card External Fault	
		An external fault condition is present.	
Cause		**Possible Solutions**	**Minor Fault Output (H2-□□ = 10)**
An external fault was received from the PLC with F6-03 = 3 (causing the drive to continue running when an external fault occurs).		• Remove the cause of the external fault. • Remove the external fault input from the PLC.	YES
There is a problem with the PLC program.		Check the PLC program and correct problems.	YES
LED Operator Display		**Minor Fault Name**	
EF1	EF1	External fault (input terminal S1)	
		External fault at multi-function input terminal S1.	
EF2	EF2	External fault (input terminal S2)	
		External fault at multi-function input terminal S2.	
EF3	EF3	External fault (input terminal S3)	
		External fault at multi-function input terminal S3.	
EF4	EF4	External fault (input terminal S4)	
		External fault at multi-function input terminal S4.	

EF5	EF5	External fault (input terminal S5)	
		External fault at multi-function input terminal S5.	
EF6	EF6	External fault (input terminal S6)	
		External fault at multi-function input terminal S6.	
Cause		**Possible Solutions**	**Minor Fault Output (H2-□□ = 10)**
An external device has tripped an alarm function.		Remove the cause of the external fault and reset the multi-function input value.	YES
Wiring is incorrect.		• Ensure the signal lines have been connected properly to the terminals assigned for external fault detection (H1-□□ = 20 to 2F). • Reconnect the signal line.	YES
Multi-function contact inputs are set incorrectly.		• Check if the unused terminals have been set for H1-□□ = 20 to 2F (External Fault). • Change the terminal settings.	YES
LED Operator Display		**Minor Fault Name**	
FbH	FbH	Excessive PID Feedback	
		The PID feedback input is higher than the level set in b5-36 for longer than the time set in b5-37, and b5-12 is set to 1 or 4.	
Cause		**Possible Solutions**	**Minor Fault Output (H2-□□ = 10)**
Parameters settings for b5-36 and b5-37 are incorrect.		Check parameters b5-36 and b5-37.	YES
PID feedback wiring is faulty.		Correct the wiring.	YES
Feedback sensor has malfunctioned.		Check the sensor and replace it if damaged.	YES
Feedback input circuit is damaged.		Replace the drive.	YES
LED Operator Display		**Minor Fault Name**	
FbL	FbL	PID Feedback Loss	
		The PID feedback input is lower than the level set in b5-13 for longer than the time set in b5-14, and b5-12 is set to 1 or 4.	
Cause		**Possible Solutions**	**Minor Fault Output (H2-□□ = 10)**
Parameters settings for b5-13 and b5-14 are incorrect.		Check parameters b5-13 and b5-14.	YES
PID feedback wiring is faulty.		Correct the wiring.	YES
Feedback sensor has malfunctioned.		Check the sensor and replace it if damaged.	YES

Feedback input circuit is damaged.		Replace the drive.	YES
LED Operator Display		**Minor Fault Name**	
HBb	Hbb	Safe Disable Signal Input	
		Both Safe Disable input channels open.	
Cause		**Possible Solutions**	**Minor Fault Output (H2-□□ = 10)**
Both Safe Disable Inputs H1 and H2 are open.		• Check if external safety circuit tripped and disabled the drive. • If the Safe Disable function is not utilized, check if the terminals HC, H1 and H2 are linked.	YES
Internally, both Safe Disable channels are broken.		Replace the drive.	YES
LED Operator Display		**Minor Fault Name**	
HBbF	HbbF	Safe Disable Signal Input	
		One Safe Disable input channels open.	
Cause		**Possible Solutions**	**Minor Fault Output (H2-□□ = 10)**
One of the inputs H1 and H2 is open while the other is closed.		• Check the wiring to device that controls the Safe Disable inputs. • If the Safe Disable function is not utilized, check if the terminals HC, H1 and H2 are linked properly.	YES
One of the Safe Disable channels is faulty.		Replace the drive.	YES
LED Operator Display		**Minor Fault Name**	
HCA	HCA	Current Alarm	
		Drive current exceeded overcurrent warning level (150% of the rated current).	
Cause		**Possible Solutions**	**Minor Fault Output (H2-□□ = 10)**
Load is too heavy.		• Measure the current flowing through the motor. • Reduce the load or increase the capacity of the drive.	YES
Acceleration and deceleration times are too short.		• Calculate the torque required during acceleration and for the inertia moment. • If the torque level is not right for the load, take the following steps: • Increase the acceleration and deceleration times (C1-01 through C1-08). • Increase the capacity of the drive.	YES

A special-purpose motor is being used, or the drive is attempting to run a motor greater than the maximum allowable capacity.		• Check the motor capacity. • Use a motor appropriate for the drive. Ensure the motor is within the allowable capacity range.	YES
The current level increased due to Speed Search after a momentary power loss or while attempting to perform a fault restart.		The alarm will appear only briefly. There is no need to take action to prevent the alarm from occurring in such instances.	YES
LED Operator Display		**Minor Fault Name**	
oH	oH	Heatsink Overheat	
		The temperature exceeded the maximum allowable value.	
Cause		**Possible Solutions**	**Minor Fault (H2-□□ = 10)**
Surrounding temperature is too high		• Check the surrounding temperature. • Improve the air circulation within the enclosure panel. • Install a fan or air conditioner to cool surrounding area. • Remove anything near drive that may cause extra heat.	YES
Internal cooling fan has stopped.		• Replace the cooling fan. ***Refer to Cooling Fan Replacement on page 250***. • After replacing the drive, reset the cooling fan maintenance parameter to (o4-03 = "0").	YES
Airflow around the drive is restricted.		• Provide proper installation space around the drive as indicated in the manual. ***Refer to Correct Installation Spacing on page 40***. • Allow for the specified space and ensure that there is sufficient circulation around the control panel.	YES
		• Check for dust or foreign materials clogging cooling fan. • Clear debris caught in the fan that restricts air circulation.	YES
LED Operator Display		**Minor Fault Name**	
oH2	oH2	Drive Overheat Warning	
		"Drive Overheat Warning" was input to a multi-function input terminal, S1 through S6 (H1-□□ = B).	
Cause		**Possible Solutions**	**Minor Fault (H2-□□ = 10)**
An external device triggered and overheat warning in the drive.		• Search for the device that tripped the overheat warning. • Solving the problem will clear the warning.	YES
LED Operator Display		**Minor Fault Name**	
oH3	oH3	Motor Overheat	
		The motor overheat signal entered to a multi-function analog input terminal exceeded the alarm level (H3-02 or H13-10 = E).	

Cause	Possible Solutions	Minor Fault (H2-□□ = 10)
Motor thermostat wiring is fault (PTC input).	Repair the PTC input wiring.	YES
There is a fault on the machine side (e.g., the machine is locked up).	• Check the status of the machine. • Remove the cause of the fault.	YES
Motor has overheated.	• Check the load size, accel/decel times, and cycle times. • Decrease the load. • Increase accel and decel times (C1-01 to C1-08). • Adjust the preset V/f pattern (E1-04 through E1-10). This will mainly involve reducing E1-08 and E1-10. **Note:** Do not lower E1-08 and E1-10 excessively, because this reduces load tolerance at low speeds. • Check the motor-rated current. • Enter motor-rated current on motor nameplate (E2-01). • Ensure the motor cooling system is operating normally. • Repair or replace the motor cooling system.	YES

LED Operator Display		Minor Fault Name
oL3	oL3	Overtorque 1
		Drive output current (or torque in OLV) was greater than L6-02 for longer than the time set in L6-03.

Cause	Possible Solutions	Minor Fault (H2-□□ = 10)
Inappropriate parameter settings.	Check parameters L6-02 and L6-03.	YES
There is a fault on the machine side (e.g., the machine is locked up).	• Check the status of the machine. • Remove the cause of the fault.	YES

LED Operator Display		Minor Fault Name
oL4	oL4	Overtorque 2
		Drive output current (or torque in OLV) was greater than L6-05 for longer than the time set in L6-06.

Cause	Possible Solutions	Minor Fault Output (H2-□□ = 10)
Parameter settings are not appropriate.	Check parameters L6-05 and L6-06.	YES
There is a fault on the machine side (e.g., the machine is locked up).	• Check the status of the machine being used. • Remove the cause of the fault.	YES

LED Operator Display		Minor Fault Name
oS	oS	Overspeed (for Simple V/f with PG)
		Pulse input (RP) indicates that motor speed feedback exceeded F1-08 setting.

Cause		Possible Solutions	Minor Fault Output (H2-□□ = 10)
Overshoot or undershoot is occurring.		• Adjust the gain by using the pulse train input parameters (H6-02 through H6-05). Adjust the speed feedback accuracy. • Increase the settings for C5-01 (Speed Control Proportional Gain 1) and reduce C5-02 (Speed Control Integral Time 1).	YES
PG pulse settings are incorrect.		Set the H6-02 (Pulse Train Input Scaling) = 100%, the number of pulses during maximum motor revolutions.	YES
Parameter settings are inappropriate.		Check the setting for the overspeed detection level and the overspeed detection time (F1-08 and F1-09).	YES
LED Operator Display		**Minor Fault Name**	
ou	ov	DC Bus Overvoltage	
		The DC bus voltage exceeded the trip point. For 200 V class: approximately 410 V For 400 V class: approximately 820 V (740 V when E1-01 < 400)	
Cause		**Possible Solutions**	**Minor Fault (H2-□□ = 10)**
Surge voltage present in the drive input power.		• Install a DC reactor or an AC reactor. • Voltage surge can result from a thyristor convertor and a phase advancing capacitor operating on the same drive input power system.	YES
• The motor has short-circuited. • Ground current has over-charged the main circuit capacitors via the drive input power.		• Check the motor power cable, relay terminals and motor terminal box for short circuits. • Correct grounding shorts and turn the power back on.	YES
Noise interference causes the drive to operate incorrectly.		• Review possible solutions for handling noise interference. • Review section on handling noise interference and check control circuit lines, main circuit lines and ground wiring. • If the magnetic contactor is identified as a source of noise, install a surge protector to the MC coil.	YES
		Set number of fault restarts (L5-01) to a value other than 0.	YES
LED Operator Display		**Minor Fault Name**	
PASS	PASS	MEMOBUS/Modbus Comm. Test Mode Complete	
Cause		**Possible Solutions**	**Minor Fault Output (H2-□□ = 10)**
MEMOBUS/Modbus test has finished normally.		This verifies that the test was successful.	No output

LED Operator Display		Minor Fault Name	
PGo	PGo	PG Disconnect (for Simple V/f with PG)	
		Detected when no PG pulses received for a time longer than setting in F1-14.	
Cause		**Possible Solutions**	**Minor Fault Output (H2-□□ = 10)**
Pulse input (RP) is disconnected.		Reconnect the pulse input (RP).	YES
Pulse input (RP) wiring is wrong.		Correct the wiring.	YES
Motor brake is engaged.		Ensure the brake releases properly	YES
LED Operator Display		**Minor Fault Name**	
rUn	rUn	Motor Switch during Run	
		A command to switch motors was entered during run.	
Cause		**Possible Solutions**	**Minor Fault Output (H2-□□ = 10)**
A motor switch command was entered during run.		Change the operation pattern so that the motor switch command is entered while the drive is stopped.	YES
LED Operator Display		**Minor Fault Name**	
UL3	UL3	Undertorque Detection 1	
		Drive output current (or torque in OLV) less than L6-02 for longer than L6-03 time.	
Cause		**Possible Solutions**	**Minor Fault (H2-□□ = 10)**
Inappropriate parameter settings.		Check parameters L6-02 and L6-03.	YES
Load has dropped or decreased significantly.		• Check for broken parts in the transmission system.	YES
LED Operator Display		**Minor Fault Name**	
UL4	UL4	Undertorque Detection 2	
		Drive output current (or torque in OLV) less than L6-05 for longer than L6-06 time.	
Cause		**Possible Solutions**	**Minor Fault (H2-□□ = 10)**
Inappropriate parameter settings.		Check parameters L6-05 and L6-06.	YES
The load has dropped or decreased significantly.		• Check for broken parts in the transmission system.	YES

LED Operator Display		Minor Fault Name
Uu	Uv	Undervoltage
		• One of the following conditions was true when the drive was stopped and a run command was entered: • DC bus voltage dropped below the level specified in L2-05. • Contactor to suppress inrush current in the drive was open. • Low voltage in the control drive input power. This alarm outputs only if L2-01 is not 0 and DC bus voltage is under L2-05.

Cause	Possible Solutions	Minor Fault (H2-□□ = 10)
Phase loss in the drive input power.	Check for wiring errors in the main circuit drive input power. Correct the wiring.	YES
Loose wiring in the drive input power terminals.	• Ensure the terminals have been properly tightened. • Apply the tightening torque specified in this manual to fasten the terminals. *Refer to Wire Gauges and Tightening Torque on page 59*	YES
There is a problem with the drive input power voltage.	• Check the voltage. • Lower the voltage of the drive input power so that it is within the limits listed in the specifications.	YES
Drive internal circuitry is worn.	• Check the maintenance time for the capacitors (U4-05). • Replace the drive if U4-05 exceeds 90%.	YES
The drive input power transformer is not large enough and voltage drops when the power is switched on.	• Check for a tripped alarm when the magnetic contactor, line breaker and leakage breaker are turned on. • Check the capacity of the drive input power transformer.	YES
Air inside the drive is too hot.	• Check the temperature inside the drive.	YES
The CHARGE indicator light is broken or disconnected.	• Replace the drive.	YES

5.6 Operator Programming Errors

An Operator Programming Error (oPE) occurs when an inappropriate parameter is set or an individual parameter setting is inappropriate. The drive will not operate until the parameter is set correctly; however, no alarm or fault outputs will occur. If an oPE occurs, investigate the cause and refer to *Table 5.10* for the appropriate action. When oPE error is displayed, press the ENTER button to display U1-34 (oPE fault constant). This monitor displays the parameter causing the oPE error.

◆ oPE Codes, Causes, and Possible Solutions

Table 5.10 oPE Codes, Causes, and Possible Solutions

LED Operator Display		Error Name
oPE01	oPE01	Drive Capacity Setting Fault
		Drive capacity and then value set to o2-04 do not match.
Cause		**Possible Solutions**
The drive capacity setting (o2-04) and the actual capacity of the drive are not the same.		Correct the value set to o2-04.
LED Operator Display		**Error Name**
oPE02	oPE02	Parameter Range Setting Error
		Use U1-18 to find which parameters were set outside the setting range.
Cause		**Possible Solutions**
Parameters were set outside the possible setting range.		Set parameters to the proper values.
Note: Other errors are given precedence over oPE02 when multiple errors occur at the same time.		
LED Operator Display		**Error Name**
oPE03	oPE03	Multi-Function Input Selection Error
		A contradictory setting is assigned to multi-function contact inputs H1-01 through to H1-06.
Cause		**Possible Solutions**
• The same function is assigned to two multi-function inputs. • Excludes “Not used” and “External Fault.”		• Ensure all multi-function inputs are assigned to different functions. • Re-enter the multi-function settings to ensure this does not occur.
The Up command was set but the Down command was not, or vice versa (settings 10 vs. 11).		Correctly set functions that need to be enabled in combination with other functions.
The Up 2 command was set but the Down 2 command was not, or vice versa (settings 75 vs. 76).		

• Run /Stop command for 2-wire sequence 2 was set (H1-□□ = 42), but forward/reverse command (H1-□□ = 43) was not. • "Drive Enable" is set to multi-function input S1 or S2 (H1-01 = 6A or H1-02 = 6A).		Correctly set functions that need to be enabled in combination with other functions.
• Two of the following functions are set at the same time: • Up / Down Command (10 vs. 11) • Up 2 / Down 2 Command (75 vs. 76) • Hold Accel/Decel Stop (A) • Analog Frequency Reference Sample / Hold (1E) • Offset Frequency 1, 2, 3 Calculations (44, 45, 46)		• Check if contradictory settings have been assigned to the multi-function input terminals at the same time. • Correct setting errors.
The Up/Down command (10, 11) is enabled at the same time as PID control (b5-01).		Disable control PID (b5-01 = "0") or disable the Up/ Down command.
• One of the following settings at the multi-function input terminals: • External Search Command 1 and External Search Command 2 (61 vs. 62) • Fast-Stop N.O. and Fast-Stop N.C. (15 vs. 17) • KEB for Momentary Power Loss and High Slip Braking (65, 66, 7A, 7B vs. 68) • Motor Switch Command and Accel/Decel Time 2 (16 vs. 1A) • KEB Command 1 and KEB Command 2 (65, 66 vs. 7A, 7B) • FWD Run Command (or REV) and FWD/REV Run Command (2-wire) (40, 41 vs. 42, 43) • External DB Command and Drive Enable (60 vs. 6A)) • Motor Switch Command and UP2/DOWN2 Command (16 vs. 75, 76)		Check for contradictory settings assigned to the multi-function input terminals at the same time. Correct setting errors.
• One of the following settings was entered while H1-□□ = 2 (External Reference 1/2): • b1-15 = 4 (Pulse Train Input) and H6-01 (Pulse Train Input Function Selection) not = 0 (Frequency Reference) • b1-15 or b1-16 set to 3 but no option card connected • Although b1-15 = 1 (Analog Input) and H3-02 or H3-10 are set to 0 (Frequency Bias).		Correct the settings for the multi-function input terminal parameters.
H2-□□ = 38 (Drive Enabled) but H1-□□ is not set to 6A (Drive Enable).		
H1-□□ = 7E (Direction Detection) although H6-01 is not set to 3 (Simple V/f with PG).		
LED Operator Display		**Error Name**
oPE04	oPE04	Initialization required.

Cause		Possible Solutions
The drive, control board, or terminal board has been replaced and the parameter settings between the control board and the terminal board no longer match.		To load the parameter settings to the drive that are stored in the terminal board, set A1-03 to 5550. Initialize parameters after drive replacement by setting A1-03 to 1110 or 2220.
LED Operator Display		**Error Name**
oPE05	oPE05	Run Command Selection Error
		The Run command selection parameter b1-02 is set to 3 but no option board is installed.
Cause		**Possible Solutions**
Frequency reference is assigned to an option card (b1-01 = 3) that is not connected to the drive.		Reconnect the option card to the drive.
The Run command is assigned to an option card (b1-02 = 3) that is not connected to the drive.		
Frequency reference is assigned to the pulse train input (b1-01 = 4), but terminal RP is not set for pulse train input (H6-01 is greater than 0).		Set H6-01 to "0".
LED Operator Display		**Error Name**
oPE07	oPE07	Multi-Function Analog Input Selection Error
		A contradictory setting is assigned to multi-function analog inputs H3-02 through to H3-10 and PID functions conflict.
Cause		**Possible Solutions**
H3-02 and H3-10 are set to the same value.		Change the settings to H3-02 and H3-10 so that functions no longer conflict. **Note:** Both 0 (primary analog frequency reference) and F (Not Used) can be set to H3-02 and H3-10 at the same time.
The following simultaneous contradictory settings: H3-02 or H3-10 = B (PID Feedback) and H6-01 (Pulse Train Input) = 1 (PID Feedback)		Disable one of the PID selections.
The following simultaneous contradictory settings: H3-02 or H3-10 = C (PID Target Value) and H6-01 = 2 (pulse train input sets the PID target value)		
The following simultaneous contradictory settings: H3-02 or H3-10 = C (PID Target Value) and b5-18 = 1 (enables b5-19 as the target PID value)		
The following simultaneous contradictory settings: H6-01 or H3-10 = C (PID Target Value) and b5-18 = 1 (enables b5-19 as the target PID value)		
LED Operator Display		**Error Name**
oPE08	oPE08	Parameter Selection Error
		A function has been set that cannot be used in the motor control method selected.

Cause	Possible Solutions
Attempted to use a function in the V/f motor control method that is only possible in Open Loop Vector Control.	Check the motor control method and the functions available.
Simple V/f with PG was enabled while not in V/f Control (H6-01 = 3).	To use Simple V/f with PG, ensure the motor control method has been set to V/f Control (A1-02 = “0”).
In Open Loop Vector Control, n2-02 is greater than n2-03	Correct parameter settings so that n2-02 is less than n2-03.
In Open Loop Vector Control, C4-02 is greater than C4-06	Correct parameter settings so that C4-02 is less than C4-06.
In PM Open Loop Vector Control, parameters E5-02 to E5-07 are set to 0.	• Set the correct motor code in accordance with the motor being used (E5-01). • When using a special-purpose motor, set E5-□□ in accordance with the Test Report provided.
The following conditions are true in PM Open Loop Vector Control: E5-03 does not equal 0 E5-09 and E5-24 are both equal to 0, or neither equals 0	Set E5-09 or E5-24 to the correct value, and set the other to “0”. Set the motor-rated current for PM to “0” (E5-03).
Note: Use U1-18 to find which parameters are set outside the specified setting range. Other errors are given precedence over OPE08 when multiple errors occur at the same time.	

LED Operator Display		Error Name
oPE09	oPE09	PID Control Selection Fault
		PID control function selection is incorrect. Requires that PID control is enabled (b5-01 = 1 to 4).
Cause		**Possible Solutions**
The following simultaneous contradictory settings: b5-15 not 0.0 (PID Sleep Function Operation Level) The stopping method is set to either DC injection braking or coast to stop with a timer (b1-03 = 2 or 3).		• Set b5-15 to another value besides 0. • Set the stopping method to coast to stop or ramp to stop (b1-03 = “0” or “1”).
LED Operator Display		**Error Name**
oPE10	oPE10	V/f Data Setting Error
		The following setting errors have occurred where: E1-04 is greater than or equal to E1-06 is greater than or equal to E1-07 is greater than or equal to E1-09. Or the following setting errors have occurred: E3-04 is greater than or equal to E3-06 is greater than or equal to E3-07 is greater than or equal to E3-09.
Cause		**Possible Solutions**
—		Correct the settings for E1-04, -06, -07 and -09 (or E-04, -06, -07, -09 for motor 2).
LED Operator Display		**Error Name**
oPE11	oPE11	Carrier Frequency Setting Error
		Correct the setting for the carrier frequency.

Cause	Possible Solutions
The following simultaneous contradictory settings: C6-05 is greater than 6 and C6-04 is greater than C6-03 (carrier frequency lower limit is greater than the upper limit). If C6-05 is less than or equal to 6, the drive operates at C6-03.	Correct the parameter settings.
Upper and lower limits between C6-02 and C6-05 contradict each other.	

LED Operator Display		Error Name
oPE 13	oPE13	Pulse Monitor Selection Error
		Incorrect setting of monitor selection for Pulse Train (H6-06).

Cause	Possible Solutions
Scaling for the Pulse Train monitor is set to 0 (H6-07 = 0) while H6-06 is not set to 101, 102, 105, or 116.	Change scaling for the Pulse Train monitor or set H6-06 to 101, 102, 105, or 116.

LED Operator Display		Error Name
oPE 14	oPE14	Application setting error
		Incorrect setting in combination with simple positioning stop or Bi-directional output conversion.

Cause	Possible Solutions
Parameter b1-03 = 9 (simple positioning stop) and • Drive is not initialized to European settings (o2-09 is not 2) • Dwell function is activated (b6-03 or b6-04 are not 0) • the KEB function is activated (H1-□□ = 65/66/7A/7B) • Stall prevention during deceleration is enabled (L3-04 is not 0) • Over voltage suppression is enabled (L3-11 = 1) • High slip braking is enabled (H1-□□ = 68) • An S-curve is applied to the deceleration ramp (C2-03 and C2-04 are not 0) PID output or frequency reference to bi-directional output frequency reference is enabled (d4-11 = 1) and the drive is not initialized to European settings.	Check the initialization mode in parameter o2-09. Correct the parameter settings.

5.7 Auto-Tuning Fault Detection

Auto-Tuning faults are shown below. When the following faults are detected, the fault is displayed on the Digital Operator and the motor coasts to a stop. No fault or alarm outputs will occur

◆ Auto-Tuning Codes, Causes, and Possible Solutions

Table 5.11 Auto-Tuning Codes, Causes, and Possible Solutions

LED Operator Display		Error Name
Er-01	Er-01	Motor Data Error
Cause		**Possible Solutions**
Motor data or data entered during Auto-Tuning incorrect.		• Check that the motor data entered to the T1 parameters match the information written on the motor nameplate input before Auto-Tuning. • Start Auto-Tuning over again and enter the correct information.
Motor output and motor-rated current settings (T1-02 and T1-04) do not match.		• Check the drive and motor capacities. • Correct the settings of parameters T1-02 and T1-04.
Motor output and no-load current settings (T1-04 and E2-03) do not match. This data is required only when Auto-Tuning for Open Loop Vector Control or when performing Stationary Auto-Tuning.		• Check the motor-rated current and no-load current. • Correct the settings of parameters T1-04 and E2-03.
Base frequency and base motor rotations (T1-05 and T1-07) do not match.		Set T1-05 and T1-07 to the correct value.
LED Operator Display		**Error Name**
Er-02	Er-02	Minor Fault
Cause		**Possible Solutions**
Motor data entered during Auto-Tuning was incorrect.		• Motor data entered to the T1 parameters does not match the information written on the motor nameplate. Enter the correct data. • Start Auto-Tuning over again and enter the correct information.
The wiring is faulty.		• Check the wiring and correct defective connections. • Check around the machine. • Check the load. • Use the information on page 237 to find out what caused the problem.
Load is too heavy.		
LED Operator Display		**Error Name**
Er-03	Er-03	STOP Button Input

Cause		Possible Solutions
Auto-Tuning canceled by pressing STOP button.		Auto-Tuning did not complete properly and will have to be performed again.
LED Operator Display		**Error Name**
Er-04	Er-04	Line-to-Line Resistance Error
Cause		**Possible Solutions**
Motor data entered during Auto-Tuning was incorrect.		• Motor data entered to the T1 parameters does not match the information written on the motor nameplate. Enter the correct data. • Start Auto-Tuning over again and enter the correct information.
Auto-Tuning did not complete within designated time frame.		• Check and correct faulty motor wiring. • Disconnect the motor from machine and perform Rotational Auto-Tuning.
Drive-calculated values outside parameter setting range.		
LED Operator Display		**Error Name**
Er-05	Er-05	No-Load Current Error
Cause		**Possible Solutions**
Motor data entered during Auto-Tuning was incorrect.		• Motor data entered to the T1 parameters does not match the information written on the motor nameplate. Enter the correct data. • Restart Auto-Tuning and enter the correct information.
Auto-Tuning did not complete within designated time frame.		• Check and correct faulty motor wiring. • Disconnect the motor from machine and perform Rotational Auto-Tuning.
Drive-calculated values outside parameter setting range.		
LED Operator Display		**Error Name**
Er-08	Er-08	Rated Slip Error
Cause		**Possible Solutions**
Motor data entered during Auto-Tuning was incorrect.		• Motor data entered to the T1 parameters does not match the information written on the motor nameplate. Enter the correct data. • Restart Auto-Tuning and enter the correct information.
Auto-Tuning did not complete within designated time frame.		• Check and correct faulty motor wiring. • Disconnect the motor from machine and perform Auto-Tuning.
Values calculated by the drive are outside the allowable parameter setting ranges.		
LED Operator Display		**Error Name**
Er-09	Er-09	Acceleration Error (detected only during Rotational Auto-Tuning)
Cause		**Possible Solutions**
The motor did not accelerate for the specified acceleration time.		• Increase the acceleration time (C1-01). • Check if it is possible to disconnect the machine from the motor.

Torque limit when motoring is too low (L7-01 and L7-02).	• Check the settings of parameters L7-01 and L7-02). • Increase the setting.
LED Operator Display	**Error Name**
Er-11	Motor Speed Fault (detected only when Auto-Tuning is enabled)
Cause	**Possible Solutions**
Torque reference is too high. (Enabled in OLV only.)	• Increase the acceleration time (C1-01). • Disconnect the machine from the motor, if possible.
LED Operator Display	**Error Name**
Er-12	Current Detection Error
Cause	**Possible Solutions**
One of the motor phases is missing (U/T1, V/T2, W/T3).	Check motor wiring and correct problems.
Current exceeded the current rating of the drive.	• Check the motor wiring for a short between motor lines. • If a magnetic contactor is used between motors, ensure it is on. • Replace the drive.
The current is too low.	
Attempted Auto-Tuning without motor connected to the drive.	Connect the motor and perform Auto-Tuning.
Current detection signal error.	Replace the drive.
LED Operator Display	**Error Name**
End1	Excessive V/f Setting. Detected only during Rotational Auto-Tuning, and displayed after Auto-Tuning is complete.
Cause	**Possible Solutions**
The torque reference exceeded 20% during Auto-Tuning.	• Before Auto-Tuning the drive, verify the information written on the motor nameplate and enter that data to T1-03 through T1-05. • Enter proper information to parameters T1-03 to T1-05 and repeat Auto-Tuning. • If possible, disconnect the motor from the load and perform Auto-Tuning.
The results from Auto-Tuning the no-load current exceeded 80%.	
LED Operator Display	**Error Name**
End2	Motor Iron-Core Saturation Coefficient. Detected only during Rotational Auto-Tuning and displayed after Auto-Tuning is complete.
Cause	**Possible Solutions**
Motor data entered during Auto-Tuning was incorrect.	• Motor data entered to the T1 parameters does not match the information written on the motor nameplate. • Restart Auto-Tuning and enter the correct information.
Auto-Tuning calculated values outside the parameter setting range, assigning the iron-core saturation coefficient (E2-07, -08) a temporary value.	• Check and correct faulty motor wiring. • Disconnect the motor from machine and perform Rotational Auto-Tuning.

LED Operator Display		Error Name
End3	End3	Rated Current Setting Alarm (displayed after Auto-Tuning is complete)
Cause		**Possible Solutions**
• The motor line-to-line resistance and the motor-rated current are not consistent with one another. • The correct current rating printed on the nameplate was not entered into T1-04.		• Check the setting of parameter T1-04. • Check the motor data and repeat Auto-Tuning.

5.8 Diagnosing and Resetting Faults

When a fault occurs and the drive stops, follow the instructions below to remove whatever conditions triggered the fault, then restart the drive.

◆ Fault Occurs Simultaneously with Power Loss

WARNING! *Electrical Shock Hazard. Ensure there are no short circuits between the main circuit terminals (R/L1, S/L2, and T/L3) or between the ground and main circuit terminals before restarting the drive. Failure to comply may result in serious injury or death and will cause damage to equipment.*

1. Turn on the drive input power.
2. Use monitor parameters U2-☐☐ to display data on the operating status of the drive just before the fault occurred.
3. Remove the cause of the fault and reset.

Note: To find out what faults were triggered, check U2-02 (Fault History). Information on drive status when the fault occurred such as the frequency, current and voltage, can be found in U2-03 through U2-17. ***Refer to Viewing Fault Trace Data after Fault on page 223*** for information on how to view fault trace data.

Note: When the fault continues to be displayed after cycling power, remove the cause of the fault and reset.

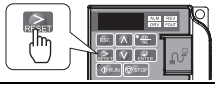
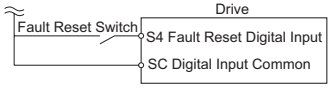
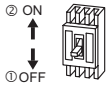
◆ If the drive still has power after a fault occurs

1. Look at the LED operator for information on the fault that occurred.
2. ***Fault Displays, Causes, and Possible Solutions on page 183***
3. Reset the fault. ***Refer to Fault Reset Methods on page 223***.

◆ Viewing Fault Trace Data after Fault

	Step		Display/Result
1.	Turn on the drive input power. The first screen displays.	⇒	
2.	Press ∧ until the monitor screen is displayed.	⇒	
3.	Press ENTER to display the parameter setting screen.	⇒	
4.	Press ∧ and > until U2-02 (Fault History) is displayed.	⇒	
5.	Press ENTER to view most recent fault (here, oC).	⇒	
6.	Press ∧ to view drive status information when fault occurred.		
7.	Parameters U2-03 through U2-17 help determine cause of fault.	⇒	

◆ Fault Reset Methods

After the Fault Occurs	Procedure	
Fix the cause of the fault, restart the drive, and reset the fault	Press the RESET button on the digital operator	
Resetting via Fault Reset Digital Input S4	Close then open the fault signal digital input via terminal S4. S4 is set fault reset as default (H1-04 = 12)	
If the above methods do not reset the fault, turn off the drive main power supply. Reapply power after LED operator display is out.		

5.9 Troubleshooting without Fault Display

This section is for troubleshooting problems that do not trip an alarm or fault.

◆ Cannot Change Parameter Settings

Cause	Possible Solutions
The drive is running the motor (i.e., the Run command is present).	• Stop the drive and switch over to the Programming Mode. • Most parameters cannot be edited during run.
The Access Level is set to restrict access to parameter settings.	• Set the Access Level to allow parameters to be edited (A1-02 = 2).
The operator is not in the Parameter Setup Mode (the LED screen will display “PAr”).	• See what mode the LED parameter is current set for. • Parameters cannot be edited when in the Setup Mode (“STUP”). Switch modes so that “PAr” appears on the screen.
A multi-function contact input terminal is set to allow or restrict parameter editing (H1-01 through H1-06 = 1B).	• When the terminal is open, parameters cannot be edited. • Turn on the multi-function contact input set to 1B.
The wrong password was entered.	• If the password entered to A1-04 does not match the password saved to A1-05, then drive settings cannot be changed. • Reset the password. • If you cannot remember the password: • Display parameter A1-04. Press the button while pressing at the same time. Parameter A1-05 will appear. • Set a new password to parameter A1-05.
Undervoltage was detected.	• Check the drive input power voltage by looking at the DC bus voltage • (U1-07). • Check all main circuit wiring.

◆ Motor Does Not Rotate Properly after Pressing RUN Button or After Entering External Run Command

■ Motor Does Not Rotate

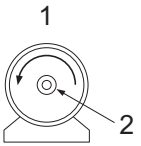
Cause	Possible Solutions
The drive is not in the Drive Mode.	• Check if the DRV light on the LED operator is lit. • Enter the Drive Mode to begin operating the motor. *Refer to The Drive and Programming Mode on page 93*.

Cause	Possible Solutions
The LO/RE button was pushed.	• Stop the drive and check if the correct frequency reference source is selected. If the operator keypad shall be the source, the LO/RE button LED must be on, if the source is REMOTE, it must be off. • Take the following steps to solve the problem: • Push the LO/RE button. • If o2-01 is set to 0, then the LO/RE button will be disabled.
Auto-Tuning has just completed.	• When Auto-Tuning has completed, the drive is switched back to the Programming Mode. The Run command will not be accepted unless the drive is in the Drive Mode. • Use the LED operator to enter the Drive Mode. ***Refer to The Drive and Programming Mode on page 93***.
A Fast-Stop was executed and has not yet been reset.	Reset the Fast-Stop command.
Settings are incorrect for the source that provides the run command.	Check parameter b1-02 (Run Command Selection). Set b1-02 so that it corresponds with the correct run command source. 0: LED/LCD operator 1: Control circuit terminal (default setting) 2: MEMOBUS/Modbus communications 3: Option card
One of the Safety Inputs is open.	• Check for a short-circuit between terminals H1 and HC. • See if one of the Safety Inputs is open. • Correct any faulty wiring.
There is faulty wiring in the control circuit terminals.	• Check the wiring for the control terminal. • Correct wiring mistakes. • Check the input terminal status monitor (U1-10).
The drive has been set to accept the frequency reference from the incorrect source.	Check parameter b1-01 (Frequency Reference Selection 1). Set b1-01 to the correct source of the frequency reference. 0: LED operator 1: Control circuit terminal (default setting) 2: MEMOBUS/Modbus communications 3: Option card 4: Pulse train input (RP)
The terminal set to accept the main speed reference is set to the incorrect voltage and/or current.	Check DIP switch S1. Next assign the correct input level to terminal A2 (H3-09). ***Refer to Terminal A2 Switch on page 75***.
Selection for the sink/source mode is incorrect.	Check DIP switch S3. ***Refer to Sinking/Sourcing Mode Switch on page 73***.
Frequency reference is too low.	• Check the frequency reference monitor (U1-01). • Increase the frequency by changing the maximum output frequency (E1-09).

Cause	Possible Solutions
Multi-function analog input is set up to accept gain for the frequency reference, but no voltage (current) has been provided.	• Check the multi-function analog input settings. • Check if analog input A1 or A2 is set for frequency reference gain (H3-02/10 = 1). If so, check if the correct signal is applied to the terminal. The gain and the frequency reference will be 0 if no signal is applied to the gain input. • Check if H3-02 and H3-10 have been set to the proper values. • Check if the analog input value has been set properly.
The STOP button was pressed when the drive was started from a REMOTE source.	• When the STOP button is pressed, the drive will decelerate to stop. • Switch off the run command and then re-enter a run command. • The STOP button is disabled when o2-02 is set to 0.
Motor is not producing enough torque in the V/f motor control method.	• Ensure the selected V/f pattern corresponds with the characteristics of the motor being used. • Set the correct V/f pattern to E1-03. • When E1-03 = F, increase both the minimum and mid output frequency voltages (E1-08, E1-10).
	Increase the frequency reference so that it is higher than the minimum frequency reference (E1-09).
	Perform Line-to-Line Resistance Auto-Tuning when using particularly long motor cables.
	Increase the torque compensation gain (C4-01).
Motor is not producing enough torque in Open Loop Vector Control.	• Execute Rotational Auto-Tuning. • If the motor cables are replaced with longer cables after Rotational Auto-Tuning was performed, Auto-Tuning may need to be repeated due to voltage drop across the line.
	• Check if the torque limit parameters have been set too low (L7-01 through L7-04). • Reset the torque limit back to its default setting (200%).
	Increase both the minimum and mid output frequency voltages (E1-08 and E-10).
The drive is set for both 2-wire and 3-wire sequence at the same time.	• The drive is set for a 3-wire sequence when one of parameters H1-03 through H1-06 is set to 0. • If the drive is supposed to be set up for a 2-wire sequence, then ensure parameters H1-03 through H1-06 are not set to 0. • If the drive is supposed to be set up for a 3-wire sequence, then H1-☐☐ must be set to 0. Refer to *Table 5.2* for additional information.

■ Motor Rotates in the Opposite Direction from the Run Command

Cause	Possible Solutions
Phase wiring between the drive and motor is incorrect.	• Check the motor wiring. • Switch two motor cables (U, V, and W) to reverse motor direction. • Connect drive output terminals U/T1, V/T2 and W/T3 in the right order to the corresponding motor terminals U, V, and W.

Cause	Possible Solutions
The forward direction for the motor is set-up incorrectly.	• Typically, forward is designated as being counterclockwise when looking from the motor shaft (refer to the figure below).  • **1. Forward Rotating Motor (looking down the motor shaft)** **2. Motor Shaft**
The motor is running at almost 0 Hz and the Speed Search estimated the speed to be in the opposite direction.	• Disable bi-directional search (b3-14 = “0”) so that Speed Search is performed only in the specified direction.

Note: Check the motor specifications for the forward and reverse directions. The motor specifications will vary depending on the manufacturer of the motor.

■ Motor Rotates in One Direction Only

Cause	Possible Solutions
The drive prohibits reverse rotation.	• Check parameter b1-04. • Set the drive to allow the motor to rotate in reverse (b1-04 = “0”).
A Reverse run signal has not been entered, although 3-wire sequence is selected.	• Make sure that one of the input terminals S3 to S6 used for the 3-wire sequence has been set for reverse.

■ Motor is Too Hot

Cause	Possible Solutions
The load is too heavy.	• If the load is too heavy for the motor, the motor will overheat as it exceeds its rated torque value for an extended period of time. • Keep in mind that the motor also has a short-term overload rating in addition to the possible solutions provided below: • Reduce the load. • Increase the acceleration and deceleration times. • Check the values set for the motor protection (L1-01, L1-02) as well as the motor rated current (E2-01). • Increase motor capacity.
The air around the motor is too hot.	• Check the ambient temperature. • Cool the area until it is within the specified temperature range.
The drive is operating in a vector control mode but Auto-Tuning has not yet been performed.	• Perform Auto-Tuning. • Calculate the motor value and reset the motor parameters. • Change the motor control method to V/f Control (A1-02 = “0”).

Cause	Possible Solutions
Insufficient voltage insulation between motor phases.	When the motor is connected to terminals U/T1, V/T2, and W/T3, voltage surges occur between the motor coils and drive switching. Normally, surges can reach up to three times the drive input power supply voltage (600 V for 200 V class, and 1200 V for 400 V class). Use a motor with voltage tolerance higher than the max voltage surge. Use a motor designed to work specifically with a drive when using a 400 V class unit. Install an AC reactor on the output side of the drive.
The motor fan has stopped or is clogged.	Check the motor fan.

■ Drive Does Not Allow Selection of Rotational Auto-Tuning

Cause	Possible Solutions
The drive is in the incorrect motor control method for Rotational Auto-Tuning.	• Check if the drive is set to V/f Control by accident (A1-02 = 0). • Change the motor control method to Open Loop Vector Control (A1-02 = “2”).

■ Motor Hunting Occurs at Low Speeds

Cause	Possible Solutions
Excessive load inertia in Open Loop Vector Control.	• Excess load inertia can cause motor hunting in Open Loop Vector Control due to slow motor response. • Increase the speed feedback detection control time constant (n2-02) from its default value of 50 ms to an appropriate level between 200 and 1000 ms. Adjust this setting in combination with n2-03 (Feedback Detection Control Time Constant 2).

■ Overvoltage Occurs When Running at a Constant Speed

Cause	Possible Solutions
Excessive load inertia in Open Loop Vector Control.	• Loads with a lot of inertia (fans, etc.) can trigger an overvoltage fault when operating in Open Loop Vector Control. • Switch to the V/f motor control method. • Adjust the values set for the speed feedback detection control time constant (n2-02, n2-03).

■ Motor Stalls During Acceleration or With Large Loads

Cause	Possible Solutions
Load is too heavy.	• Take the following steps to resolve the problem: • Reduce the load. • Increase the acceleration time. • Increase motor capacity. • Although the drive has a Stall Prevention function and a Torque Compensation Limit function, accelerating too quickly or trying to drive an excessively large load can exceed the capabilities of the motor.

■ Motor Will Not Accelerate or the Acceleration Time is Too Long

Cause	Possible Solutions
Frequency reference is too low.	• Check the maximum output frequency (E1-04). • Increase E1-04 if it is set too low.
	Check U1-01 for proper frequency reference.
	Check if a frequency reference signal switch has been set to one of the multi-function input terminals.
	Check for low gain level set to terminals A1 or A2 (H3-03, H3-11).
Load is too heavy.	• Reduce the load so that the output current remains within the motor-rated current. • In extruder and mixer applications, the load will sometimes increase as the temperature drops.
	Check if the mechanical brake is fully releasing as it should.
The torque limit function is operating in Open Loop Vector Control.	• Check the torque limit setting. It may be too low. (L7-01 through L7-04). • Reset the torque limit to its default value (200%).
Acceleration time has been set too long.	Check if the acceleration time parameters have been set too long (C1-01, -03, -05, -07).
Motor characteristics and drive parameter settings are incompatible with one another in V/f Control.	• Select the correct V/f pattern so that it matches the characteristics of the motor being used. • Check E1-03 (V/f Pattern Selection).
The right combination of motor characteristics have not been set in Open Loop Vector Control.	Execute Rotational Auto-Tuning.
Incorrect frequency reference setting.	• Check the multi-function analog input settings. • Check if multi-function analog input terminal A1 or A2 is set for frequency gain (H3-02 or H3-10 = “1”). If so, the frequency reference will be 0 if there is no voltage (current) input provided. • Ensure H3-02 and H3-10 are set to the proper values. • Ensure the analog input value is set to the right value (U1-13, U1-14).
The Stall Prevention level during acceleration and deceleration set too low.	• Check the Stall Prevention level during acceleration (L3-02). • If L3-02 is set too low, acceleration will take a fair amount of time. • Increase L3-02.

Cause	Possible Solutions
The Stall Prevention level during run has been set too low.	• Check the Stall Prevention level during run (L3-06). • If L3-06 is set too low, speed will drop as the drive outputs torque. • Increase the setting value.
Although the drive is operating in Open Loop Vector motor control method, Auto-Tuning has not been performed.	• Perform Auto-Tuning. • Calculate motor data and reset motor parameters. • Switch to the V/f motor control method (A1-02 = “0”).
Drive reached the limitations of the V/f motor control method.	• The motor cable may be long enough (over 50 m) to require Auto-Tuning for line-to-line resistance. Also be aware that V/f Control is comparatively limited when it comes to producing torque at low speeds. • Consider switching to Open Loop Vector Control.

■ Drive Frequency Reference Differs from the Controller Frequency Reference Command

Cause	Possible Solutions
The analog input frequency gain and bias are set to incorrect values.	• Check the frequency reference terminal input gain level assigned to terminals A1 and A2, as well as the frequency reference input bias to terminal A1 and A2 (parameters H3-03, H3-04, and H3-12). • Set these parameters to the appropriate values.
A frequency bias signal is being entered via analog input terminals A1 or A2.	• If multi-function analog input terminals A1 and A2 are set for frequency reference (H3-02 = 0 and H3-10 = 0), the addition of both signals builds the frequency reference. • Ensure that H3-02 and H3-10 are set appropriately. • Check the input level set for terminals A1 and A2 (U1-13, U1-14).

■ Poor Speed Control Accuracy

Cause	Possible Solutions
Drive reached the slip compensation limit.	• Check the slip compensation limit (C3-03). • Increase the value set to C3-03.
Motor-rated voltage is set too high in Open Loop Vector Control.	• The input voltage for the drive determines the maximum output voltage. A drive with an input of 200 Vac can only output a maximum of 200 Vac. Open Loop Vector Control sometimes calculates an output voltage reference value that exceeds the maximum drive output voltage level, resulting in a loss of speed control accuracy. • Use a motor with a lower voltage rating (a vector control motor). • Increase the input power voltage.
Auto-Tuning did not complete properly for Open Loop Vector Control.	• Perform Auto-Tuning again.

■ Deceleration Takes Too Long With Dynamic Braking Enabled

Cause	Possible Solutions
L3-04 is set incorrectly.	• Check the Stall Prevention Level during deceleration (L3-04). • If a braking resistor option has been installed, disable Stall Prevention during deceleration (L3-04 = “0”).
The deceleration time is set too long.	Set deceleration to more appropriate time (C1-02, C1-04, C1-06, C1-08).
Insufficient motor torque.	• Assuming parameter settings are normal and that no overvoltage occurs when there is insufficient torque, it is likely that the demand on the motor has exceeded the motor capacity. • Use a larger motor.
Reaching the torque limit.	• Check the settings for the torque limit (L7-01 through L7-04). • If the torque limit is enabled, deceleration might take longer than expected because the drive cannot output more torque than the limit setting. Ensure the torque limit is set to a large enough value. • Increase the torque limit setting.
	• If multi-function analog input terminal A1 or A2 is set to torque limit (H3-02 or H3-10 equals 10, 11, 12, or 15), ensure that the analog input levels are set to the correct levels. • Ensure H3-02 and H3-10 are set to the right levels. • Ensure the analog input is set to the correct value.
Load exceeded the internal torque limit determined by the drive rated current.	Switch to a larger capacity drive.

■ Motor Hunting Occurs When Operating With a Light Load

Cause	Possible Solutions
Carrier frequency is too high.	Lower the carrier frequency setting C6-02.
Large V/f setting value at low speeds triggers overexcitation.	• Select the proper V/f pattern (E1-03). • Use parameters E1-04 through E1-10 to set the V/f pattern in relation to the load characteristics.
The maximum output frequency and the base frequency reference are not set properly in relationship to each other.	Set the proper values for the maximum output frequency and base frequency (E1-04, E1-06).
Hunting Prevention is disabled (V/f control only).	• Enable Hunting Prevention by setting n1-01 = “1”. • (OLV only) Increase the speed feedback detection control gain and time constant (n2-01, n2-02).

■ Load Falls When Brake is Applied (Hoist-Type Applications)

Cause	Possible Solutions
The timing for the brake to close and release is not set properly.	• Use frequency reference detection for closing and releasing the brake. • At start: Release the brake after creating enough torque. • At stop: Close the brake when the motor still produces torque. • Make the following setting changes to hold the brake: • Set the frequency detection inactive during baseblock (L4-07 = 0). • Multi-function contact output terminal will switch on when the output frequency is greater than the frequency detection level set in L4-01. Set L4-01 between 1.0 and 3.0 Hz. • Slipping may occur when stopping because hysteresis is used in Frequency Reference 2 (where the frequency agree setting in L4-02 is 2.0 Hz). To prevent this, change the setting to 0.1 Hz. • Do not use the multi-function contact output setting “During Run” (H2-01 = 0) for the brake signal.
Insufficient DC Injection Braking.	Increase the amount of DC Injection Braking (b2-02).

■ Noise From Drive or Output Lines When the Drive is Powered On

Cause	Possible Solutions
Relay switching in the drive generates excessive noise.	• Lower the carrier frequency (C6-02). • Install a noise filter on the input side of drive input power. • Install a noise filter on the output side of the drive. • Place the wiring inside a metal conduit to shield it from switching noise. • Ground the drive and motor properly • Separate the main circuit wiring and the control lines.

■ Ground Fault Circuit Interrupter (GFCI) Trips During Run

Cause	Possible Solutions
Excessive leakage current trips MCCB.	• Increase the GFCE sensitivity or use GFCI with a higher threshold. • Lower the carrier frequency (C6-02). • Reduce the length of the cable used between the drive and the motor. • Install a noise filter or reactor on the output side of the drive.

■ Connected Machinery Vibrates When Motor Rotates

Excessive Motor Oscillation and Erratic Rotation

Cause	Possible Solutions
Poor balance between motor phases.	Check drive input power voltage to ensure that it provides stable power.

Unexpected Noise from Connected Machinery

Cause	Possible Solutions
The carrier frequency is at the resonant frequency of the connected machinery.	Adjust the carrier frequency using parameters C6-02 through C6-05.
The drive output frequency is the same as the resonant frequency of the connected machinery.	• Adjust the parameters used for the Jump Frequency function (d3-01 through d3-04) to skip the problem-causing bandwidth. • Place the motor on a rubber pad to reduce vibration.

Note: The drive may have trouble assessing the status of the load due to white noise generated when using Swing PWM (C6-02 = 7 to A, or 7 if set for Normal Duty).

■ Oscillation or Hunting

Cause	Possible Solutions
Insufficient tuning in Open Loop Vector Control.	Adjust the following parameters in the order listed. An increase in gain should be followed with an increase in the primary delay time constant. • C4-02 (Torque Compensation Primary Delay Time) n2-01 (Speed Feedback Detection Control [AFR] Time Constant 1) C3-02 (Slip Compensation Primary Delay Time) The response for torque compensation and slip compensation will drop as the time constant is increased.
Auto-Tuning has not yet been performed (required for Open Loop Vector Control).	• Perform Auto-Tuning. • Set motor parameters after calculating the proper values. • Change the motor control method to V/f Control (A1-02 = “0”).
Insufficient tuning in V/f Control.	Adjust the following parameters in the order listed. • .n1-02 (Hunting Prevention Gain Setting) • n1-03 (Hunting Prevention Time Constant Setting) • n1-05 (Hunting Prevention Time Constant in Reverse Direction) when hunting occurs in reverse rotation direction only.
Gain is too low when using PID control.	Check the period of oscillation and adjust P, I, and D settings accordingly.
The frequency reference is assigned to an external source.	• Ensure that noise is not affecting the signal lines. • Separate main circuit wiring and control circuit wiring. • Use twisted-pair cables or shielded wiring for the control circuit. • Increase the analog input time filter constant (H3-13).
The cable between the drive and motor is too long.	• Perform Auto-Tuning. • Reduce the length of the cable.

■ PID output fault

Cause	Possible Solutions
No PID feedback input.	• Check the multi-function analog input terminal settings. • Set multi-function analog input terminal A1 or A2 for PID feedback (H3-02 or H3-10 = “B”). • A signal input to the terminal selection for PID feedback is necessary. • Check the connection of the feedback signal. • Check the various PID-related parameter settings. • No PID feedback input to the terminal causes the value detected to be 0, causing a PID fault and the drive to operate at max frequency.
The level of detection and the target value do not correspond with each other.	• PID control keeps the difference between target and detection values at 0. Set the input level for the values relative to one another. • Use analog input gains H3-03/11 to adjust PID target and feedback signal scaling.
Reverse drive output frequency and speed detection. When output frequency rises, the sensor detects a speed decrease.	Set PID output for reverse characteristics (b5-09 = “1”).

■ Insufficient Motor Torque

Cause	Possible Solutions
Auto-Tuning has not yet been performed (required for OLV Control).	Perform Auto-Tuning.
The control mode was changed after performing Auto-Tuning.	Perform Auto-Tuning again.
Only Line-to-Line Resistance Auto-Tuning was performed.	Perform Rotational Auto-Tuning.

■ Motor Rotates After the Drive Output is Shut Off

Cause	Possible Solutions
Low DC Injection Braking and the drive cannot decelerate properly.	• Adjust the DC Injection braking settings. • Increase the value of b2-02 (DC Injection Braking Current). • Increase the b2-04 (DC Injection Braking Time at Stop).

■ OV or Speed Loss Occurs When Starting into a Rotating Load

Cause	Possible Solutions
The load is already rotating when the drive is trying to start it.	• Stop the motor using DC Injection braking. Restart the motor. • Increase the value of b2-03 (DC Injection Braking Time at start). • Enable Speed Search at start (b3-01 = “1”). • Set a multi-function input terminal for external Speed Search command (H1-☐☐=“61”or “62” during restart). *Figure 4.17* on *on page 126*.

■ Output Frequency is not as High as Frequency Reference

Cause	Possible Solutions
Frequency reference is set within the range of the Jump Frequency.	• Adjust the parameters used for the Jump Frequency function (d3-01 through d3-03). • Enabling the Jump Frequency prevents the drive from outputting the frequencies specified in the Jump Frequency range.
Upper limit for the frequency reference has been exceeded.	• Set the maximum output frequency and the upper limit for the frequency reference to more appropriate values (E1-04, d2-01). • The following calculation yields the upper value for the output frequency = E1-04 × d2-01 / 100
Large load triggered Stall Prevention function during acceleration.	• Reduce the load. • Adjust the Stall Prevention level during acceleration (L3-02).

■ Buzzing Sound from Motor at 2 kHz

Cause	Possible Solutions
Exceeded 110% of the rated output current of the drive while operating at low speeds.	• If the output current rises too high at low speeds, the carrier frequency automatically reduces and causes a whining or buzzing sound. • If the sound is coming from the motor, disable carrier frequency derating (L8-38 = “0”). • Disabling the automatic carrier frequency derating increases the chances of an overload fault (oL2). Switch to a larger capacity motor if oL2 faults occur too frequently.

■ Unstable Motor Speed when Using PM or IPM

Cause	Possible Solutions
The motor code for PM (E5-01) is set incorrectly. (Yaskawa motors only)	Set parameter E5-01 in accordance with the motor being used.
The drive is operating at less than 10% of the speed reference.	Consult with OYMC about using a different type of motor when attempting to operate at 10% of the speed reference.
Motor hunting occurs.	Set and carefully adjust the following parameters in the order listed: n8-45 (Speed Feedback Detection Suppression Gain) n8-55 (Load Inertia for PM Motors) C4-02 (Torque Compensation Primary Delay Time)
Hunting occurs at start.	Increase the S-curve time at the start of acceleration (C2-01).
Too much current is flowing through the drive.	If using a PM motor, set the correct motor code to E5-01. If using a specialized motor, set parameter E5-xx to the correct value according to the Motor Test Report.

■ Motor Does Not Operate When the RUN Button on the Digital Operator is

Pressed

Cause	Possible Solutions
The LOCAL/REMOTE mode is not selected properly.	Press the LOCAL/REMOTE button to switch. The LO/RE LED should be on for LOCAL mode.
The drive is not in drive mode.	A run command will not be issued. Exit to the drive mode and cycle the run command.
The frequency reference is too low.	• If the frequency reference is set below the frequency set in E1-09 (Minimum Output Frequency), the drive will not operate. • Raise the frequency reference to at least the minimum output frequency.

■ Motor Does Not Operate When an External Run Command is Input

Cause	Possible Solutions
The LOCAL/REMOTE mode is not selected properly.	Press the LOCAL/REMOTE button to switch. The LO/RE LED should be off for REMOTE mode.
The drive is not in Drive Mode.	A run command will not be issued. Exit to the Drive mode and cycle the run command.
The frequency reference is too low.	• If the frequency reference is set below the frequency set in E1-09 (Minimum Output Frequency), the drive will not operate. • Raise the frequency reference to at least the minimum output frequency.

■ Motor Stops During Acceleration or When a Load is Connected

Cause	Possible Solution
• The load is too heavy. • The limit of motor response may be reached during rapid acceleration. This may be a result of improper stall prevention or automatic torque boost function adjustment. (L3-01 = 2)	Increase the acceleration time (C1-01) or reduce the motor load. Also, consider increasing the motor size and/or drive size.

■ Motor Rotates in One Direction Only

Cause	Possible Solution
"Reverse run prohibited" is selected. If b1-04 (Reverse Prohibit Operation) is set to 1 (reverse run prohibited), the drive will not accept a reverse run command.	Set b1-04 = “0” to allow reverse run operation.

■ Motor Operates at a Higher Speed than the Speed Command

Cause	Possible Solution
PID is enabled. If the PID mode is enabled (b5-01 = 1 to 4), the drive output frequency will change to regulate the process variable to the target setpoint. The PID can command a speed up to maximum output frequency (E1-04).	If PID operation is not target, disable PID by setting b5-01 = “0”.

■ Poor Speed Control Accuracy Above Base Speed in Open-Loop Vector Motor Control Method

Cause	Possible Solution
The maximum output voltage of the drive is determined by its input voltage. Vector control uses voltage to control the currents within the motor. If the vector control voltage reference value exceeds the drive output voltage capability, the speed control accuracy will decrease because the motor currents cannot be properly controlled.	Use a motor with a lower rated voltage compared to the input voltage.

■ Peripheral Devices Affected by Drive Operation

Cause	Possible Solutions
Radio frequency interference may be generated by drive output PWM waveform.	• Change the Carrier Frequency Selection (C6-02) to lower the carrier frequency. This will help to reduce the amount of transistor switching noise. • Install an Input Noise Filter at the input power terminals. • Install an Output Noise Filter at the motor terminals. • Use conduit. Metal can shield electrical noise. • Ground the drive and motor. • Separate main circuit wiring from control wiring.

■ Ground Fault Interrupter Activates When Drive is Running

Cause	Possible Solutions
The output of the drive is a series of high frequency pulses (PWM), so there is a certain amount of leakage current. This may cause the ground fault interrupter to operate and cut off the drive input power.	• Change to a ground fault interrupter with a higher leakage current detection level (such as, a sensitivity current of 200 mA or greater per Unit, with an operating time of 0.1 s or more), or one that incorporates high-frequency countermeasures. • Change the Carrier Frequency Selection (C6-02) to lower the carrier frequency. **Note:** Leakage current increases in proportion to cable length.